MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE. Assistant Editor: FRANK OWEN STETSON.

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The MONTHLY WEATHER REVIEW is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Señor Anastasio Alfaro, Director of the National Observatory, San José, Costa Rica; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian, which is exactly five hours behind Greenwich time, is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

NOTE ON EVAPORIMETERS.[1]

By B. F. E. KEELING, Superintendent Precise Survey, Survey Department, Egypt. Dated Helwan Observatory, Helwan, Egypt, January 2, 1906.

The following note on evaporimeters is suggested by an article on the Piche evaporimeter in the MONTHLY WEATHER REVIEW for June, 1905.

In view of the all important question of water supply in Egypt, evaporimetry is a subject of great interest to meteorologists here. A systematic investigation of the actual evaporation from different classes of water surfaces and cultivated land is being undertaken.

The article in the MONTHLY WEATHER REVIEW for June, 1905, pages 253-5, gave a résumé of Prof. Thomas Russell's experiments on the Piche evaporimeter. A comparison of the values obtained with the different evaporimeters installed at the Helwan Observatory [of the Survey Department, latitude 29° 51′ 34″ N., longitude 31° 20′ 30″ E.], will probably be of interest.

(A) The instrument which has been considered as standard has been an open pan Wild evaporimeter mounted in a Renou screen, one and one-half meters by one meter, with double louvred walls. The pan has an area of 250 square centimeters, or about seven and one-half times that used by Professor Russell. When full the water surface is 1.3 centimeters below the rim. Besides this two other evaporimeters have been observed at irregular intervals during the past year.

(B) Of these one is a Piche evaporimeter mounted in the same screen as the Wild instrument. The evaporating surface of the paper disk is about 11.4 square centimeters in area.

(C) The other is an instrument recently designed by Mr. E. B. H. Wade, of the Survey Department of Egypt. Outside the observatory is a tank four meters square and one meter deep, filled with water. In the center of this is a zinc cylinder 50 centimeters in diameter which receives a separate supply of water. The water in this cylinder is automatically maintained to a constant level by an instrument which at the same time measures the quantity of water supplied, i. e., the quantity evaporated from the inner water surface. The water in the outer tank merely acts as a guard ring. The water is fully exposed to sun and wind.

In the accompanying Table 1, are given the ratios Piche/Wild and Wade/Wild. It will be seen that the mean ratio Piche/Wild is 1.45, or about 10 per cent greater than the factor found by Professor Russell. This is probably accounted for by the difference in dimensions of the evaporimeters used, particularly by the relatively large size of the Wild pan. The ratio Wade/Wild is 1.37.

Taking only the months August, October, November, and December of 1905 the ratio Wade/Piche is 0.96.

TABLE 1.—*Comparison of the Wade, Wild, and Piche evaporimeters.*

Month.	No. of days.	Mean evaporation by Wild.	Ratio— Wade/Wild	Difference from final mean.	No. of days	Mean evaporation by Wild.	Ratio— Piche/Wild	Difference from final mean.
1904.		*mm.*		*Per cent.*		*mm.*		*Per cent.*
August	27	9	1.45	+6	.....	.....	.....	.....
September	13	8	1.37	0	.....	.....	.....	.....
1905.								
May	24	14	1.33	−3	.....	.....	.....	.....
June	28	13	1.37	0	.....	.....	.....	.....
July	6	9	1.49	+9	.....	.....	.....	.....
August	23	10	1.44	+5	31	10	1.45	+1
September	5	12	1.41	+3	28	9	1.52	+6
October	24	9	1.29	−6	31	10	1.39	−3
November	29	7	1.32	−4	29	7	1.45	+1
December	23	4	1.38	+1	22	4	1.39	−3
	Weighted mean		1.37		Weighted mean		1.44	

NOTE.—The weighted means above given will vary in accordance with the adopted system of weights. If, for instance, we give the respective ratios for the last five months equal values without regarding the number of days of observation or the quantity of evaporation we get the following results:

$$\text{Wade/Wild} = 1.37$$
$$\text{Piche/Wild} = 1.44$$
$$\text{Wade/Piche} = 0.95$$

If, on the other hand, we give weights depending on the total quantity of evaporation, or the product of the number of days in the second and sixth columns by the millimeters in the third and seventh columns, respectively, then we get the following results:

$$\text{Wade/Wild} = 1.36$$
$$\text{Piche/Wild} = 1.44$$
$$\text{Wade/Piche} = 0.94$$

In general the average of any series of observed ratios is correctly found only by reducing each to a common denominator, and then giving each a weight corresponding to its own specific reliability.

[1] By permission of the Director General, Survey Department, Egypt.

In the present case, since nothing is known to the contrary, and since we rather roughly assume that the ratio is the same with all humidities, temperatures, and winds, the mean ratio for any given month must be obtained by dividing the sum total of the daily evaporations measured with one instrument by the corresponding sum total of the simultaneous observations with the other instrument. In the same way the average for several months would be the ratio of the sums of the daily evaporations for the whole period, as measured simultaneously with any two instruments.—EDITOR.

THE NEPHOLOGICAL REVIEW.

The students of meteorology will not be surprised to find that certain branches of this broad subject have been prosecuted to such an extent that special journals have begun to appear, such as the Beiträge, or Contributions to the Physics of the Free Atmosphere, which is devoted to the more difficult problems from an observational and theoretical point of view. But the newest journal, namely, La Revue Néphologique, published by A. Bracke, at Mons, Belgium, will appeal to a very wide circle of observers. The lessons to be learned from a study of the clouds are as yet but slightly appreciated by either observers, or theorists, or forecasters. The main trouble is that we have no simple method of recording cloud structure and phenomena. Photographs are helpful, but they tell us the internal motions of clouds only when we closely compare several photographs, taken at very short intervals of time. So very few observers are furnished with photogrammeters that we are generally forced to rely upon the very inartistic sketches of the ordinary observers. May the journal of Doctor Bracke stimulate interest and work in this important line of research, and develop a special class of observers who will investigate the minuter details of cloud formation.—*C. A.*

STORM AND HURRICANE INSURANCE IN THE WEST INDIES.

In the matter of insurance of plantations in the West Indian Islands against "damage by hurricanes," we would call attention to the general remarks of Mr. Howard E. Simpson, on "Tornado Insurance," published in the December, 1905, REVIEW.[1] The term "hurricane," like "tornado," can not be so defined but that the insurance companies will often be legally and properly able to evade payment of losses. It is in the interest of the insured, and of fair business dealing, to introduce into the tornado policy provisions against destruction by the directly destructive agents, i. e., wind, waves, rain, drought, frost, hail, lightning, and omit the indirect, less definite terms, tornado, hurricane, cold wave, thunderstorm, etc. For centuries we have insured against loss by accidental fire, without pretending to mention the specific agencies that may start the fire. We insure a plate glass or a mirror against loss by accidental breakage without specifying that the break must be due to a runaway horse or a stone thrown by a boy. We can not imagine that a merchant will insure his goods in the West Indies against the wind or lightning that accompanies a hurricane and not also insure it against the wind or lightning that may occur without any connection with a hurricane. The complex combinations of winds, waves, lightning, and hail involved in the idea of a hurricane, tornado, or blizzard need not enter into the text of an insurance policy, but should certainly be replaced by special mention of the directly destructive individual agents. The Weather Bureau has no desire to see the insurance business conducted in such a way that local observers will be daily called upon to testify in the courts as to whether certain destruction has been caused by a hurricane or not. At some of our stations the official in charge is overrun with subpœnas requiring him to bring his records into court and to stand a cross examination on the weather. It is to be feared that this new departure in insurance will both increase these labors and responsibilities and also increase the ease with which insurance companies evade the payment of losses.

[1] Vol. XXXIII, pp. 534-539.

The rate of insurance against damage by tornadoes could, as was shown by Mr. Simpson, be included safely in the ordinary rate against loss by fire and other sources of damage or in the ordinary marine risk. The same remark may be made as to insurance against loss by hurricane. Destruction of plantations, crops, and buildings by hurricanes is a rare occurrence, and if the policy be restricted to damage done by rain or floods within a continuous twenty-four-hour period accompanying a gale or hurricane, then the risk is still further diminished. As tropical buildings of all kinds are of slight structure, and as tropical plantations rapidly recover from a hurricane, the injury done by the latter on land is apt to be overestimated. Probably the fright and the disheartenment and the change in business relations, leading sometimes to the complete desertion of the island or neighborhood, is more important than the direct loss on the property.—*C. A.*

CLOUD BANNERS.

Every one who has lived among mountains has seen the clouds formed by the currents of moist air moving up the slopes. Sometimes the strong wind prevails only near the very top of a mountain, in which case the cloud forms a hood or cap, closely fitting and hiding the mountain top. At other times we have at the top a strong wind without enough moisture to form a cap cloud, a cape, or a tablecloth, as it is sometimes called; but, nevertheless, close to leeward of the mountain top, there is a small special region of slightly lower pressure, sometimes known as a region of discontinuity, analogous in many respects to the region immediately behind a pier in the strong current of a river. Into this region the air flows from all sides, producing a mass of whirls, analogous to the eddies behind a river pier, and, as it expands into this region, it expands just enough to form a slight cloud or haze, which floats like a flag or banner to leeward of the mountain top. The appearance, like smoke or steam, is apt to deceive a careless observer, for the whole phenomenon is simply a cloud, analogous to some forms of cirri. When the mountain top is covered with snow the drifting particles caught within this region of discontinuity also produce the appearance of steam or smoke, but it is simply drifted snow. A careful record of these cloud banners would add considerably to our knowledge of local climatology, since we so rarely can have observers stationed on mountain summits.

We are indebted to Mr. G. N. Salisbury, Section Director, Seattle, Wash., for a few observations on the banners of Mount Rainier, and we hope that many more may be recorded. He states that on March 6, 1906:

> The mountain was visible and entirely clear when I left my home on the hills at 7:15 a. m. About 8:30 a. m. the captain of the small excursion steamer *Acme* on Lake Washington, adjacent to this city, telephoned to me that there was apparently a heavy column of smoke or steam ascending from the peak of Mount Rainier and that a large number of people were watching it from the shore of the lake. * * * It could be plainly seen from the State University, where it was observed by Prof. Henry Landes, of the chair of geology, who declared it to be merely a good specimen of a cloud banner, due to a warm south wind blowing over the peak. Professor Landes has made several ascents of the mountain, and is well versed in mountain lore.
>
> The phenomenon has been observed several times before. * * * A similar appearance was noticed in December, 1894, and caused some remark. The Post-Intelligencer sent an expedition to the mountain at that time, but of course they could not get to the top at that season, only to the 9000-foot level. It was determined that the phenomenon noticed then was caused by masses of snow being carried by violent southwest winds across the lip of the crater, giving the appearance of masses of smoke, as the snow was broken into fine particles.
>
> There are, however, steam caverns in the crater, from the crevices of which a warm mist ascends in summer, as has been experienced by parties who have ascended the mountain and slept in the crater.

C. A.

THE INDEXING OF MARINE REPORTS.

The meteorologist daily needs an index to all stations at which observations have been made, and a second index to the places where the data are published, either in tabular summaries or on charts. He needs an index for ocean data as well as for land data, and these indexes for printed matter should be supplemented by a third, relative to unpublished manuscript matter preserved in archives and libraries. The German Government has begun to meet these needs as far as relates to marine records by publishing its Tabellarische Reiseberichte, or table of the log books of steamers and sailing ships preserved in the library of the Deutsche Seewarte at Hamburg. The first volume related to the year 1903, and the second brings the record down to the end of 1904. As the number of logs is so great the index includes only the more important, but after careful sifting we find that the second volume includes 1500 long voyages by about five hundred different vessels. For each voyage the index gives the dates, the locations, the times of entering and leaving the trade regions, and in special cases the highest and lowest latitudes, the dates of storms, the ocean currents, temperatures, and interesting local phenomena, such as meteors, auroras, ice floes and icebergs, and sudden changes of wind or weather. This work is an elaboration of similar undertakings by the English, Russian, and French governments, and is a continuation of the indexes or guides (fuehrer) prepared by Knipping, Koeppen, and other officials at the Seewarte since 1896.

We are informed that other nations, and possibly the United States, are preparing analogous indexes to their archives. We recall vividly the huge mass of log books collected by Matthew F. Maury between 1840 and 1860, which were destroyed as waste paper about 1869 or 1870, and we hope that such a fate will not befall the modern collection of marine reports. All that we know of ocean meteorology is embalmed in these old log books, whose contents have as yet been very imperfectly analyzed and studied. Notwithstanding their great volume and awkward shape, they should be preserved for at least a century, as it is certain that they will be needed by those who will study meteorology when we are dead and gone.

What would we not now give for full records of Hakluyt, Dampier, and earlier voyagers, and the possibility thereby afforded of studying the changes in the oceanic climates? What an invaluable contribution would it not be if we could recover that continuous record of the height of the Nile at Cairo, which runs back more than three thousand years, but nearly all of which has been lost, excepting here and there a fragment? If we are unable to answer many queries as to secular changes in climate, it is largely because we have lost the records preserved by engineers and observers from most ancient dates. Students search for these old records among the hieroglyphs of Egypt, the cuneiform records of Assyria, the old writings of China and India, the annals and diaries of the monasteries of the Middle Ages; and it is certain that generations hence will search for such fragments of our own records as may survive the ravages of time.

The ancients long since discovered that papyrus and parchment were destructible and that burned clay tablets or bricks were the most enduring of all. We have learned that if the light of the sun and the oxygen of the air are shut out we may preserve the very best of our tender paper records, in properly built libraries, for only a few centuries. They are worthy all the care that we can bestow upon them; it is a sad sight to behold unique, invaluable records, inscribed on the poorest paper, crumbling to dust under the influence of mildew, sunlight, and the noxious vapors given off by our gas lights. They should be studied from many points of view, indexed, and summarized before they disappear.—*C. A.*

THE PUBLICATION OF THE CHICAGO MEMOIRS.

Many of these memoirs were published in Parts I, II, and III of the Weather Bureau Bulletin 11, but the most important memoirs on the dynamics and physics of the earth's atmosphere still await publication. This delay was caused primarily by the assignment of Doctor Fassig to other duties; no provision having been made for the publication of these important papers, except a general understanding given by Professor Harrington that the Weather Bureau would be responsible for the work, the completion of Bulletin 11 was assigned to the Editor of the MONTHLY WEATHER REVIEW, and at present it seems likely that the unpublished memoirs will almost necessarily be printed first in the pages of the MONTHLY WEATHER REVIEW, as time and opportunity may occasionally allow.

Bulletin 11, or the Report of the International Meteorological Congress held at Chicago, Ill., was planned to contain memoirs as follows:

Section I, pp. 1–67. Weather services and methods.
Section II, pp. 68–149. Rivers and floods.
Section III, pp. 150–206. Marine meteorology.
Section IV, pp. 207–394. History and bibliography.
Section V, pp. 395–459. Agricultural meteorology.
Section VI, pp. 460–583. Atmospheric electricity and terrestrial magnetism. (Two important memoirs by Neumayer on ocean meteorology and terrestrial magnetism, respectively, were apparently lost in the mails, and have in substance been rewritten and published elsewhere.)
Section VII, pp. 585–686. Climatology.
Section VIII, pp. 687–772. Instruments and methods of investigation.
Section IX, theoretical meteorology, and Section X, thunderstorms and local storms, still await publication.—*C. A.*

THE WARMTH OF DECEMBER, 1905.

In the MONTHLY WEATHER REVIEW for August, 1894, p. 329, we had occasion to figure on the meteorological influence of a forest fire. We now notice that a daily newspaper has started the idea that possibly changes in climate, such as the mild weather of December, 1905, may be due to the great consumption of coal, especially in our large cities. It is a sufficient answer to this suggestion to say that more coal is consumed in proportion as the weather is colder, and that the warmth of December, 1905, should not be attributed to the coal consumed, any more than should the cold of December, 1904. A correspondent estimated that 100,000 tons are consumed daily in New York city. Possibly 5 per cent of the heat thus produced is added to the atmosphere as the latent heat of steam, while 95 per cent belongs to the dry gases, the CO_2, of the atmosphere. According to the best engineering figures a pound of coal, as used for making steam, evaporates from 12 to 15 pounds of water, 20 per cent of the heat being useless as far as the engine is concerned. This steam adds a little more moisture to the air of a large city, as well as a corresponding amount of heat to its atmosphere. On the other hand the sun itself pours a large quantity of heat into the city. Thus, during December, 1905, in the latitude of New York, the surface of the ground receives an average of 2.7×1375.2 calories per square centimeter per day; a vertical column receives much more than a horizontal area at this latitude and season of the year; the total received by a surface normal to the sun's rays, that is to say by the atmosphere itself, amounts to very nearly 2.0 gram calories per square centimeter per minute, or about 960 gram calories per day of eight hours of average sunshine. As there are many millions of square centimeters in a square mile we see at once that the amount of heat poured into the atmosphere over the total area of New York by the sun is so immensely superior to that furnished by the burning of 100,000 tons of coal that the latter is unimportant in general climatological studies.—*C. A.*

STYLE OF METEOROLOGICAL PUBLICATIONS.

It would be well if certain meteorological institutions, in publishing the results of observations, would keep in view the requirements of the libraries in which their publications are to be bound and preserved. The Weather Bureau Library is embarrassed by the receipt of many periodical printed reports of unwieldy size. In other cases the size of page varies from year to year, or is even altered in the middle of a year; and again the publications of a single institution exhibit a variety of sizes in reports which, but for this fact, it would be desirable to bind in one volume.

The latter case is illustrated by the publications of the Meteorological Service of the Azores. These consist of single sheets of three different sizes. The type is unnecessarily large and two of the three forms of page used are of awkward dimensions. A uniform quarto page might be substituted in these cases by the use of smaller type.

The Anales del Instituto Fisico-geográfico Nacional de Costa Rica, in which are published the very complete meteorological observations made by the Institute at San José, were formerly issued in a size not much exceeding the quarto, and small enough to be accommodated on the quarto shelves of libraries. Volume IX, however, which has recently been received by the Weather Bureau, is an unwieldy folio, having a page 16 by 12 inches, about one third of which (on most of the pages) is waste margin. Though the binder will reduce these dimensions somewhat, the volume will still be too large to be placed with the earlier numbers, an obvious disadvantage to any one consulting the file.

Capricious changes in the titles of serials, eccentricities in pagination, and many other vagaries on the part of authors and editors might be mentioned in this connection, but would take us too far afield.—*C. F. T.*

COSMIC RELATIONS OF THE ATMOSPHERE.

In reviewing a recent work by J. M. Schaeberle, of Ann Arbor, Mich., as published in the Astronomische Nachrichten, Dr. Johann Riem, of Berlin, has the following paragraph in the Beiblätter for 1906, page 57:

The assumption that certain terrestrial phenomena, like auroras and magnetic disturbances, occur when the earth passes through streams of matter emanating from the sun, is generally opposed by the fact that there is no common periodicity in these phenomena. On the other hand Schaeberle shows that such a periodicity is not to be expected, unless one assumes that the initial velocity with which the matter proceeds from the sun is the same in all these streams. He computes a table giving the following quantities for the respective initial velocities, V_0, in English miles per second; namely, T_1, the time, expressed in days, elapsing until the stream starting from the sun reaches the orbit of the earth; r, the distance (in radii of the earth's orbit as unit) to which the particles can attain; V_1, the velocity in miles per second with which they pass the earth's orbit; and T_2, the interval in days within which the current passing out of the earth's orbit returns to it again, as shown in the following table:

V_0	T_1	r	V_1	T_2
376.76	64.6	1.0	0.0	....
381.56	33.2	2.0	18.3	332
381.78	29.7	4.0	22.4	1003
381.93	28.8	6.0	23.6	1869
382.00	27.4	∞	25.9	∞

From this it appears that while the velocity, V_1, with which the particles cut across the earth's orbit may increase from 0 to 26 miles, the initial velocity increases by only one-tenth of 1 per cent.[1] With an initial velocity of 382 miles per second, or above it, the material is scattered through space to infinity; for less velocities, after an interval of from 27 to 65 days, we get traces of an influence on the earth. If the current has considerable inclination to the vertical at the sun's surface, then the phenomena are considerably more complex.

Applying this argument to a comet, of which V is the radial component of the stream, and v the velocity of the comet in its orbit, then the relative velocities before and after the perihelion passage will be as $V+v$ to $V-v$. This explains the variation in the comet's brightness and the departures from the law that would make the diminution of brightness a simple function of the distances from the sun and the earth to the comet.

[1] Thus in the text; but 1.4 per cent would seem to be correct.—*C. A.*

THE PROVINCE OF THE MONTHLY WEATHER REVIEW.

Several scientific periodicals are published in the United States in which attention is given to meteorology. The oldest of these is the American Journal of Science in which Redfield, Mitchell, Olmstead, Hare, Loomis, Tracy, Ferrel, DeForrest, and others published important papers. The well-known journal "Science," beginning about 1875, has continued to offer a field for the interchange of views on every branch of meteorology and has been distinguished by the number of short articles as compared with the longer elaborate investigations. The only periodical specially devoted to meteorology was the American Meteorological Journal founded by Harrington in 1884, and maintained at his own private expense until 1892, when it was adopted by the New England Meteorological Society and Ginn and Co., publishers.

With the advent of Professor Harrington as Chief of the Weather Bureau, July 1, 1891, the Monthly Weather Review, which had been restricted to the publication of data and notes by the officials of the Weather Bureau, was authorized to enlarge its scope, so that when the American Meteorological Journal ceased, at the close of its 12th volume, the Monthly Weather Review became the natural and most convenient medium for the publication of meteorological communications of all kinds. On the other hand there has been a danger lest its official character should give undue weight to its editorial notes and to the special articles contributed by both official and nonofficial meteorologists.

As the Chief of Bureau has made the Editor largely responsible for the character of the material published in the Review he has endeavored, by allowing the greatest freedom of publication, to encourage everyone interested in meteorology to publish his best ideas and to philosophically accept honest and kind criticism when the latter is animated solely by a desire to advance our knowledge of the subject. Of course criticism has always something of a personal aspect; it is liable to arouse opposition, replies, and counter replies, and to wound one's personal pride, but by many years of experience we have learned that there are many who hold the progress of science as something far more important than their own personal triumphs. There are those who can calmly weigh the arguments pro and con, and decide with fairness whether a certain view or theory is in accordance with the facts and in accord with the present state of our knowledge; whether it is an error long since overthrown or whether it is an hypothesis too far in advance of our present knowledge to be demonstrable now and one which must therefore be left to future generations to settle.

The sciences can advance only step by step. No one can tell where or when the next important step will originate. Many humble beginners may suggest good ideas that will be confirmed by more eminent investigators after years of work. We must be careful not to ridicule a new hypothesis, but equally careful not to adopt it as a well established principle for fear lest thereby we may be led astray. There has always been a contest between the dullards and conservatives on one side and the bright theorists on the other. The legitimate use of the imagination is the most important consideration to a man engaged in research, but the illegitimate use of the imagination is very dangerous.

If the Editor of the Monthly Weather Review occasionally allows the publication of a memoir in which the imagination is more prominent than the facts, it is not that he wishes to assist in the propaganda of some new idea, but because he is

confident that the ability of the investigator will eventually enable him to right himself and find his way out of the woods into the clear light of some important truth as yet unknown to us all.

If, on the other hand, the Editor sometimes rejects a communication in which imagination is more prominent than the facts, or in which the facts have been distorted so as to appear to support a preconceived theory, this may be because meteorology is overburdened with ill-founded notions, and students must be discouraged from pursuing really foolish or unimportant lines of work while the important problems of meteorology are almost neglected on account of their difficulty.

The MONTHLY WEATHER REVIEW is therefore a medium for honest, rational discussion of every important problem of meteorology, whether it be approached from the statistical, the experimental, or the mathematical side. It is not carrying on an unreasonable propaganda.—*C. A.*

DIURNAL VARIATION OF THE BAROMETER.

An article in Gaea, for August, 1905, by Doctor Korselt, of the Realgymnasium, or high school, at Annaberg, Germany, on the causes of the diurnal oscillation of the barometer, attempts to show how this oscillation is an important link in the chain of phenomena that results from the unequal warming of our atmosphere by insolation, and its unequal cooling by radiation. This paper is an elaboration of one presented by Doctor Korselt, in 1893, to the International Meteorological Congress at Chicago.

Korselt develops the idea that the atmosphere may be considered as a heat engine, maintained in operation by the periodical accession of solar heat, in which the motion of the atmosphere is the work that is done. The location of the driving force, analogous to a steam boiler, is in the Tropics. The pushing of the hot air from the Torrid Zone toward either pole, and its return as cold air, is renewed daily by the rotation of the earth, and is analogous to the expansion and contraction of the steam cylinder. His memoir of 1905 develops this conclusion in a popular way, without the ordinary formulas of mechanics; and he also concludes that the minute study of the daily barometric oscillation can be of great value for practical forecasting, because it ought to give us information about conditions in the atmosphere at altitudes which balloons have not yet been able to attain. If, for instance, we compiled a daily weather chart, showing the observed difference between the barometric ranges by day and by night (that is to say, the day range between the 10 a. m. maximum and the 4 p. m. minimum, and also the night range between the 10 p. m. maximum and the 4 a. m. minimum), we shall, he thinks, probably find that any temporary area of low pressure has a tendency to move toward the region where this difference of the ranges is a minimum.

The application of Korselt's rule can probably be tested in the United States better than in any other part of the world, since every regular station has its self-recording barometer, and could easily telegraph every morning the extent of the day range and night range during the preceding twenty-four hours. On the other hand these ranges are so small, and often so completely covered up by the nonperiodic changes, that relatively very large and misleading errors would seem to be inevitable.—*C. A.*

INFLUENCE OF THE OCEAN ON CONTINENTAL PRECIPITATION.

In a recent paper before the Société Helvétique des Sciences Naturelles on the interchange of moisture between land and sea,[1] Prof. Dr. Ed. Brückner estimates that 93 per cent of all the water evaporated from the ocean is returned to it in the form of precipitation, leaving but 7 per cent available for distribution over the land surface. Of the total precipitation over the land, 20 per cent is supplied directly by the ocean, while the remaining four-fifths is the recondensation of vapor evaporated from the continents.

[1] Sur le bilan du cycle de l'eau sur la terre. Archives des sci. phys. et nat. Genève, Oct., 1905. Tome 20, p. 427-30.

Professor Brückner's figures appear to be based upon the following approximate data:

1. Total evaporation from the sea, 384,000 cubic kilometers.
2. Total precipitation upon the land surface, 122,000 cubic kilometers.
3. Total volume of water returned to the sea by rivers, 24,000 cubic kilometers.

It is evident that in the long run as much water must be returned to the ocean as is taken from it. We may consider that this water is returned to the ocean in three ways: (*a*) by precipitation of water evaporated from the ocean surface; (*b*) by precipitation of water evaporated from the land and carried by winds over the ocean; (*c*) by rivers.

The rivers, therefore, are the means by which the land returns to the ocean all of the oceanic waters carried over the land and not returned in the form of aqueous vapor (as given under *b* above), and the total volume of the rivers therefore represents the difference between the amount of vapor passing from the sea over the land and that passing from the land over the sea.

By subtracting the third quantity from the first, we obtain the total precipitation over the ocean, while the difference between the second quantity and the third gives the land precipitation due to evaporation from the land.

If we might depend upon the accuracy of these figures and the underlying assumptions, it would appear that were the influence of the oceans eliminated the continents would still receive four-fifths of their present precipitation. But it is obvious that the three quantities above given are derived from measurements both incomplete and inexact. The accurate determination of evaporation is a problem that much investigation has never solved. Of the total discharge of the Amazon, the largest of rivers, and of the rainfall in its sparsely inhabited basin we have but a vague idea. The large rivers of China have never been systematically measured, and the same is true of the precipitation over extensive provinces of this secluded country. Africa has many regions as yet guiltless of the rain gage and rivers unstudied by the hydrographic engineer. In all countries numerous smaller streams, individually too unimportant to demand investigation, augment by a considerable total annual volume the waters of the sea. With the spread of civilization and the increased application of scientific methods to practical ends, we may hope to approximate closer and closer to the true values of such large factors as Professor Brückner considers. In the meantime, his figures may be provisionally accepted as indicating that the direct influence of the ocean upon continental precipitation is less than has been generally supposed.—*F. O. S.*

PRESSURE AND RAINFALL OVER THE INDIAN MONSOON AREA.

Dr. W. L. Dallas, first assistant of the Indian Meteorological Office, has presented to the American Philosophical Society a memoir on the above subject, of which an abstract is published in the proceedings of that society, Vol. XLIV, pages 159-163, from which we quote the following:

> The investigation has brought out certain relationships which appear at least worthy of record. The tentative conclusions arrived at are as follows:
>
> (1) That over the trades-monsoon area, and most markedly so over the equatorial belt, there occur four-year oscillations of pressure; (2) that during the rising portions of these oscillations the *general* rainfall of the trades-monsoon area is below, and during the falling portions is above the average, with a well-marked minimum of rainfall in the first year of the cycle and a well-marked maximum of rainfall in the third year; (3)

that from the Antarctic, or extreme southern regions, there emanate at irregular intervals rays or streamers, of varying extent and intensity, which occasion increased atmospheric pressure over the affected area; (4) these rays, or streamers, are apparently not in the least in the nature of waves, as they affect large areas practically simultaneously and continue for considerable periods; (5) when these rays, or streamers, are frequent and extensive, as in portions of the years 1899 and 1900, the pressure ranges largely above the normal, but exhibits large oscillations or fluctuations; when, on the contrary, they are absent, as in portions of the years 1898 and 1899, the pressure is low and the oscillations small; (6) these variations are superposed on the four-year cycle of the tropical belt, and are spasmodic, occurring at intervals over irregular areas, so that their influence occasions irregular variations of rainfall and irregularities in the pressure cycles.

There appears to be no satisfactory explanation either of the four-year cycle of pressure over the trades-monsoon area or of the irregular spasmodic disturbances of pressure referred to above. With regard to the cycles it is possible that compensatory actions are at work, so that when atmospheric pressure increases in one part of the world it decreases in another; though the evidence of the barometry of the United States is opposed to this, and rather suggests that the principal secular variations of pressure are of a uniform character over the whole globe. It is impossible to believe that the variations of pressure are a result of variations of rainfall. For one thing the variations are as marked in a dry area like Aden as in a wet area like Bombay, and for another the evidence, so far as it can be sifted, shows that the variations of pressure *precede* the variations of rainfall. Thus the increase of pressure which culminated in the large excess of pressure in the months of July, August, and September, 1899, commenced in February of that year, thus *preceding* by some months, and not *succeeding*, the scanty rainfall of that season.

Having had an opportunity of examining the original extensive manuscript of Mr. Dallas, the Editor feels some doubt as to whether a four-year cycle is sufficiently well established by this beginning of a research that in fact ought to include a larger area and a longer period of time than the seven years for which Mr. Dallas collected the necessary data.

It will be remembered that some years ago Hildebrandsson published a series of tables and charts showing the distribution of pressure over the whole globe, month by month, for ten years, and a few charts showing special types of distribution; from these it appears that not only is the atmosphere subject to areas of high pressure and low pressure that have long been known as subpermanent, namely, slowly changing conditions, but superposed upon these are departures from the monthly normals which are of the same nature over large portions of the globe, so that sometimes one-third or one-half of the isobars show an abnormal positive departure while the others show a negative. These areas of positive and negative departure seemed to Hildebrandsson to be subject to no law and no system of cyclic change, while the old-fashioned subpermanent areas first revealed by Buchan's maps do show appreciable systematic changes. But the idea expressed in the word "systematic," or "cyclic," or "periodic," often depends wholly upon our point of view. There can be no doubt but what the atmosphere obeys in every respect the laws of mechanics, and these must pervade the changes that seem to us so irregular. We can not expect to find many changes recurring after definite intervals of time, and therefore technically periodic. Even the diurnal and the annual periodic changes have a wide range of irregularity, most plausibly due to the action of the variable quantities of moisture and cloud in the atmosphere and the variable influences of the irregular contours of the respective continents. We may, however, understand that the reaction of continents and oceans on the atmosphere will introduce local peculiarities in the distribution of temperature, pressure, winds, and rain, and among these local peculiarities there will often appear something like a period as regards time, or a cycle of changes repeating themselves rather irregularly as regards location and time. Thus the tropical areas of high pressure over the north Atlantic and north Pacific are perpetually shifting about—north, or west, or east, or south—as well as increasing and diminishing as to their central maximum pressures. These shifts may be said to control the weather of the adjoining continental coasts. They were perceived promptly in the daily work of the Weather Bureau in 1871 and made the basis of improvements in what would otherwise have been rough forecasts of the weather. The movements of these areas of high pressure northward and southward were studied very satisfactorily by means of our daily simultaneous weather charts of the Northern Hemisphere, 1875-1889; in fact, the meteorologist, A. Poincaré, of the Meteorological Society of France, with much plausibility showed that the north-south motion was partially controlled by the monthly change of the moon in declination, although the larger part of the motion was due to the complex internal hydrodynamics of the earth's atmosphere.

The Editor has often pointed out that there is every reason to believe that all the important phenomena of climatology are the result of hydrodynamic and thermodynamic combinations within our atmosphere, and are not due to any external variation of the moon, or the radiation of the sun, or cosmic influences in general. To us cosmic meteorology, so called, is the fairy realm of the science, full of beautiful problems for the future, but far removed from the severe practical problems of terrestrial meteorology, and not to be cultivated by us until we have made better progress than now in the study of the atmosphere itself.

The geographic cycles and the chronologic periods that have been worked out by Hildebrandsson, Dallas, and others have their most pronounced development in that remarkable annual revolution by means of which the southeast trade winds of the southern Indian Ocean become the southwest monsoon of India and Cochin China. We do not expect that further study will show important new chronologic periods, but we may expect to find very important geographic cycles, such that, for instance, the droughts and floods of Australia and southern Asia and eastern Africa transmit their influences eastward over the North Pacific and find some slight response in North America. By an arrangement with Professor Hildebrandsson we have undertaken to extend his work, and hope eventually to publish the necessary series of charts for a period of about thirty years, so as to obtain a more correct view of these general phenomena and their relation to the internal economy or conservation of energy that characterizes our own atmosphere.—*C. A.*

VINCENT'S BIBLIOGRAPHY OF TREATISES ON METEOROLOGY.

The meteorological "Annuaire" of the Royal Observatory of Belgium has been published for nearly seventy years quite regularly. At first it was a combined *annuaire* for astronomy and meteorology, but since 1901 the two branches of science have been published separately, the latter under the care of Prof. A. Lancaster. In each annual volume, in addition to a large mass of tabular details relative to the climate of Brussels and meteorology in general, there are also several chapters of very general interest.

The volume for 1905 contains a contribution by E. Vanderlinden on the study of the frosts of spring and autumn, and a memoir by J. Vincent on the bibliography of treatises on meteorology; the latter occupies 45 pages. The author says that it frequently happens that persons who are desirous of posting themselves as to the present state of meteorology inquire what works are most to be recommended. This demand can perhaps best be answered by publishing a list of the best treatises in various languages. But such a list is much longer than one would expect; the various authors have written for a great variety of readers, from the most elementary books for children up to the more difficult technical treatises. It is therefore impossible to recommend any particular work unless one knows the capacity of the would-be reader. Consequently the latter should examine the general list of treatises and

select the books whose titles seem promising; and eventually he must study several of these before he feels entirely satisfied. Here we find meteorology taught from the point of view of the sailor, the farmer, the physician, the merchant, the astronomer, the physicist, the forecaster, and perhaps some might even say the mathematician. The whole subject has many aspects, and each looks at it from his own point of view. Vincent's list is classified according to the languages in which the treatises are written, rather than the countries in which they are published. His list of authors, names, and dates of the various editions and translations will enable those interested in the subject to look up the books themselves in such libraries as may be at hand.

The numbers of the titles are as follows: Greek, 2 titles; Latin, 43; French, 65; German, 121; English, 42; Italian, 13; Dutch, 5; Russian, 5; Danish, 1; Spanish, 2; Hungarian, 1; Norwegian, 1; Portuguese, 1.

Many of these titles, especially those in French, German, and English, are translations of treatises already published in other languages, so that the whole number of independent works is about 200.—*C. A.*

METEOROLOGY IN EGYPT.

We learn from H. G. Lyons, Esq., Director General of the Survey Department, Cairo, Egypt, that the following changes will be made in the publication of the meteorological observations of Egypt and the Sudan, commencing January, 1906.

(1) The daily observations made at climatological stations will no longer be published monthly, but will be included in the annual report.

(2) The Monthly Weather Summary will be enlarged, and will include additional stations so as to connect the Egyptian and Sudan area with those of India and Europe, and will give a detailed summary of the climate of the month, together with the mean and extreme values of the principal meteorological phenomena.

(3) The Annual Meteorological Report will include:

(*a*) An account of the climate of the year in Egypt and the Sudan.

(*b*) The hourly observations made at the Helwan Observatory.

(*c*) The daily observations made at the climatological stations.

(*d*) The measurements of rainfall and the river gage readings of the Nile.

THE COLORS OF DUST-HAZE.

The German steamer *Schonfels* reports a sand storm for two days, February 16 and 17, in the Red Sea. The air was thick with a yellowish mist; every distant object had its tinge of yellow. These sand storms are the accompaniments of areas of low pressure with high winds that pass from northern Africa on to the Mediterranean, and are themselves the whirls that are formed between great areas of high pressure over Europe and the Sahara of Africa and Syria. But what we would especially call attention to is the fact that the reddish and yellowish sands, and the corresponding red and yellow hazes of the sky, differ entirely in appearance from the very white haze that accompanies the harmattan which blows from the same region southward and southwestward until it reaches the adjacent Atlantic Ocean. This northeasterly harmattan, with its white haze, occurs at the same time as the southerly sirocco with its yellowish and reddish haze, and both seem to represent the outflow from a mass of dry air, descending on the Sahara and the Sudan under the Tropic of Cancer, especially during the months of December–February. The dust of the sirocco is essentially sand, but that of the harmattan consists of the minutest shells and fragments of shells of fresh water infusoria, and microscopic algae or diatoms. The whiteness of the diatom dust, as it gathers on the decks and rigging of the vessels passing through a harmattan, like the whiteness of the harmattan haze and its hazy sky, is due not to any special color of the diatom shells, since they are composed of transparent pure quartz, but is one of the many and varied diffraction phenomena produced by the action of minute irregular objects on a beam of light. If these objects are of nearly the same size, shape, and distance they produce a white haze, with such colored borders and spectra as we see in halo and rainbow phenomena; but if they are very irregular as to size and shape we have only the whitish haze without well-defined color bands. On the other hand the red and yellow tints of the sirocco haze seem to be due, not to any irregularity of shape or size, but to the color of the stony particles themselves as brought out by transmitted light. A very complete exposition of diffraction phenomena will be found in Chapters VII and XX of the new treatise on physical optics by Prof. R. W. Wood.—*C. A.*

CAN WE ARGUE FROM THE CLIMATE BACK TO THE OROGRAPHY?

An interesting application of our knowledge of the physics of the atmosphere is discussed by Sir Clements Markham, in the July number of the Geological Journal of London, 1905.

Explorers in the Antarctic regions have observed warm southerly winds on the mountainous eastern coast of Victoria Land. The existence of such winds arouses the question as to what they can teach us relative to the extent and shape of the Antarctic Continent. Thus far geographers have located four masses of land along the Antarctic Circle, and between them a submerged plateau, at a depth of 250 fathoms, all of which appear to form the northern coast of Victoria Land. Sir Clements's argument, to the effect that the eastern coast of Victoria Land sweeps farther south toward Graham Land, is based upon the probability that the warm southerly winds are not foehn winds, since they are reported to be damp and laden with snow, and therefore could not have just previously descended from mountains. They are oftener from the southwest than from the south. A little to the west is Mount Erebus, over which the winds come in an upper current from the west, as shown by the smoke,[1] and do not descend to sea level. It is, therefore, reasonable to suppose that, since they are not foehn winds, they must come from an open ocean to the south, possibly far south, beyond the South Pole, and therefore from the open Weddell Sea beyond the pole, just as warm north winds reach the east coast of Victoria Land from the open ocean to the north. It is possible, as stated by Mr. Shaw, that the snow coming with the south winds may be a surface drift, but in fact the observers on the expedition reported that heavy falls of snow from the clouds came with southerly winds, and that they were warm, not cold, winds.

We may be allowed to add that in America, when cold polar winds are followed by warm so-called equatorial winds with clouds and snow, we attribute much of the warmth to the evolution of heat that accompanies the formation of snow, and also to the protection against radiation offered by the cloudy canopy; and the presence of a sufficient quantity of vapor to form clouds and snow does not necessarily imply the presence of any large body of open water near at hand. To be sure we have heavy snowfalls along the Atlantic coast from Virginia to Maine, in which a southeast wind has brought moist air from the Atlantic only 100 miles away, but we also have heavy snows on the western slope of the Appalachians and over the Lake region, in which moist southwest winds have come, not from the Gulf of Mexico, near at hand, but demonstrably from equatorial regions, so far away that the moisture and the air must be considered as belonging to the general circulation of the atmosphere; and it would be hazardous speculation to argue from these winds and snows back to the character of the continent over which they have traveled.—*C. A.*

KRAKATOA DUST *versus* KRAKATOA VAPOR.

With reference to the origin of the so-called volcanic dust from Krakatoa, Pelée, etc., it should be remarked that it would require a systematic long-continued mechanical grinding to make an impalpable powder so uniformly fine as to be able to produce beautiful sky colors of uniform tint and wave length by diffraction. To me it seems more plausible that such fine dust, if it existed, must have resulted from the evaporation of the drops of water and condensed steam ejected by the vol-

[1] Is not this a banner cloud rather than smoke from Mount Erebus?—*C. A.*

cano. Such water must undoubtedly have been ejected hot, and must have held in solution a large percentage of the soluble solids—rock-salt, quartz, feldspar, etc. The water of these cloud particles would soon disappear in the upper air by evaporation, and their solid contents would be left floating as an impalpable powder of particles, whose size could be determined by optical methods.

On the other hand it is also important to remark that it is not unlikely that the famous red sunsets of 1883-4 were due to simple selective reflection from solid dust fragments, or to diffraction between dust particles, or to refraction and dispersion through transparent crystals. To me it seems most likely that another optical process was involved, and that these sunsets were produced essentially by a combination of two phenomena, namely (1) the selective absorption of the sunlight by the atmospheric aqueous vapor, a dense layer of which allows the red rays only to be transmitted, and (2) the diffraction of the red rays thus produced, as they passed between minute spheres of water or minute particles of dust. The diffraction effect thus produced depends on the size of these spheres or particles, and this determines the extent and duration of the sunset glow at any one place, as well as the limits of its geographical distribution. The red tint was produced by the absorptions. The particles of dust could not produce these beautiful diffraction phenomena unless they had great uniformity in their size and distribution. It is most likely that both the colored suns, the sunset sky colors, and the successive afterglows, as also the Bishop's ring of 15° to 25° radius, were due to the same minute vapor particles or so-called "vapor dust," and that mineral dust played only a minor part in their production.

Whether the particles were dust or vapor we shall obtain the same results as to their dimensions by a computation based on the diffraction formula first given by Fraunhofer, according to which particles that have an average diameter of 0.000153 Paris inch, or 0.000145 English inch, or 0.00368 millimeter, would fairly well explain the red sunset phenomena observed by me from August to November, 1885, at Washington; particles whose average diameter is 0.000101 Paris inch, or 0.000095 English inch or 0.00241 millimeter, would explain the phenomena of Bishop's ring, as observed by me on the same dates.

The fact that the red sunset phenomena continued for two years longer, my last observation being in February, 1887, and that they are frequently visible now all over the globe as a pink spot in the west after sunset, in mid-ocean as well as in the center of a continent, and that the spot never was a rare phenomenon, increases the probability that they are due to moisture rather than to mineral dust. (See American Meteorological Journal, April, 1889, Volume V, pages 529-544.)

An afterglow of a beautiful pink tint was frequently observed by myself in tropical regions during the cruise of the *Pensacola*, October, 1889, to May, 1890, on the United States scientific expedition to the west coast of Africa.—*C. A.*

THE CONVECTION THEORY OF WHIRLWINDS.

It is well known that Professor Espy, in developing his theory of the formation of tornadoes, and also, we believe, Doctor Mitchell of North Carolina have both of them quoted a few definite cases in which the whirl in an ascending column of flame and smoke over a fire in forest or cane brake developed into a cloud with a moving, whirling column, which, during the course of a half hour, became a rainstorm, a tornado, or thunderstorm, depending upon the condition of the surrounding atmosphere. Many others will perhaps agree with the Editor in having themselves seen a rising mass of air become at first hazy and then cloudy, and eventually turn into a rainstorm before disappearing on the horizon. The Editor has had occasion to publish a special description of a dust whirl with a beautiful delicate central column of vapor haze, a true incipient waterspout, forming on a hot afternoon over Pennsylvania avenue in Washington, D. C., and moving along for several minutes until broken up by the mixture of currents over the house tops.

In one of the bulletins published on the U. S. S. *Pensacola* in November, 1889, during the United States Eclipse Expedition to the west coast of Africa, he published some details as to the formation, growth, and dissipation of a series of twenty or thirty waterspouts among which that vessel sailed and into some of which it penetrated.

The latest illustration of the formation of local whirls and clouds is contained in a letter from Rev. G. M. Davis, Cedartown, Ga., dated March 15, 1905.

He stated that he "raked together a circle of dry leaves, fired them simultaneously on four sides, and noted that on two sides of the circle the fire was hotter where the pile of leaves was thicker." He then "noticed that a miniature whirlwind formed in the flame and smoke, continuing so long as the heat was greater on two sides and there was no fire in the center, while all distinguishable rotary motion ceased as soon as the heat became equable at all points." This observation suggests to him the following hypothesis with regard to hurricanes, namely, "that the interior of a circle 500 miles in diameter is filled with air of a certain temperature and surrounded by air of a higher temperature; that in this outer circle the two opposite sides are hotter than the remaining portion, and that the hot air streaming upward from these two special regions constitutes the source of the whirlwind."

This is one form of the many diversified hypotheses that have been offered, all of which taken together are known as the convectional theory. Considerable attention is given to these theories in the Editor's work known as "Preparatory Studies for Deductive Methods in Storm and Weather Predictions," Washington, 1880. Without experimenting with fire one may do even better by watching the movements of the steam and air above a horizontal surface of boiling water. (See page 29 of that work.) The rising vortex is by no means the only form of motion. However, all such theories seem not to be directly applicable to the origin of hurricanes, however well they may apply to the origin of tornadoes and thundershowers. In the case of the hurricane we have to deal with nearly horizontal motions; the ascending component is so slight that although it exists and is important yet it can not be thought of as causing the whirlwind. In so far as hurricanes have been traced back to their origin the daily weather maps simply show a large area of perhaps 10,000 square miles within which the winds are light and variable, and the temperature and moisture a little higher than on the outside. A strong current of wind suddenly appears pouring into this region—it may be a northerly wind on the west side or a southerly wind on the east side, an easterly wind on the north side or a westerly wind on the south side—and quickly the whole mass gets into motion, and the barometer falls in the central region.

Ferrel has shown that the fall in the barometer and the rotation of the whole mass is due to the diurnal rotation of the earth on its axis. A very slight barometric depression is sufficient to start a current of air in the direction of the gradient, and this wind then causes a great barometric gradient in a direction at right angles to it; so the isobars and gradients shown on our daily weather maps around every storm center are the result of the winds and the rotation of the earth. When once the rotation is started it would die away, on account of the resistances offered by the earth's surface, unless there were some maintaining cause, and two such causes have been discussed.

First. That one suggested by Espy, and especially worked out

by Ferrel, namely, the heat evolved by the condensation of vapor into cloud and rain.

Second. The surplus energy derived from the underflow of the cold air from polar regions toward the equator, and the return of the equatorial air toward the pole, the importance of which has been especially insisted upon by Professor Bigelow.

These polar and equatorial currents may be superposed vertically or may flow on side by side laterally. In the former case they roll over and over each other where they meet, and form roll clouds, roll cumuli, roll cirrus, and bring sudden changes from warm to cold and from cold to warm, with a preliminary slight dash of rain. In the latter case they whirl around a central region with a grand sweep, with southerly winds on the east and northerly winds on the west side, in the Northern Hemisphere, and the whole system moves along over the surface of the globe day after day; there is usually heavy rain on the east side, and according to Ferrel this must contribute to the maintenance of the whirl.

These great whirls with low pressure at the center lie between much larger areas of high pressure, and are sometimes said to be fed by them. After they have moved northward beyond the influence of the high pressure of the North Temperate Zone and approach the Arctic Zone, they seem to die away, and we do not yet know enough about the storms north of 65° north latitude to say with certainty whether they are straight-line gales or hurricanes.

We have used the words "whirlwind," "hurricane," and "tornado" because there can be no doubt what is meant by these terms. The technical meteorologists would use the single word "cyclone," or "area of low barometer," or simply "low;" but we have avoided the use of the word "cyclone" because our correspondent, like many other writers and the whole newspaper fraternity, has applied the word "cyclone" specifically to tornadoes, which we think is very objectionable. Of course we recognize the fact that the English language is in a state of perpetual change and the usage of one century is sure to differ from that of the next, but it is not common in scientific literature to arbitrarily change the meaning of such a specific word as "tornado."

The word "cyclone" was devised as equivalent to a special theory as to how the wind moves in hurricanes on the ocean, and ought never to have been applied to a tornado. That erroneous usage began, so far as we know, with a popular sensational newspaper writer in 1875. Another similar writer endeavored to go him one better by introducing the French word *tourbillion* as being a little more high-sounding than the correct French word *tourbillon*. We could wish that this usage had survived, as it would have saved us the annoyance of the popular confusion of the terms "tornado" and "cyclone."—*C. A.*

A METHOD OF PREDICTING THE MOVEMENT OF TROPICAL CYCLONES.

By Mr. MAXWELL HALL. Dated Montego Bay, Jamaica, W. I., February 19, 1906.

At the given time and place let p be the pressure, i. e., the reading of the barometer in inches and decimals of an inch, corrected for instrumental error, reduced to 32° F., sea level, and standard gravity, and further corrected for diurnal variation; let p_m be the mean value of p for the season; let $\Delta p = p_m - p$, so that Δp is the fall of pressure below the mean; and let r be the distance, in miles, between the observer and the nearest edge of the central calm area of the cyclone.

Let a line be drawn from the center through the place of observation to the outer limit of the cyclone; then along that line, and except when near the central calm, we have the equation—

$$\Delta p = \frac{c}{\sqrt{r-a}} \qquad (1)$$

a and c are constants along the line; and if a curve be drawn showing the relation between Δp and r it will be found that Δp leaves the curve at a certain point near the central calm, and then follows the tangent to the curve at that point until it reaches the calm.

This statement applies only to tropical cyclones; in higher latitudes other forces, such as the effect of the rotation of the earth, render equation (1) quite inapplicable.

Let us take as an example the Jamaica cyclone of August 11, 1903. The center moved in a remarkably straight line from Martinique to Jamaica, and on to the Cayman Islands, at the rate of 20 miles an hour, and as the edge of the central calm reached Montego Bay at 9:15 a. m., there is no difficulty in obtaining the different values of r given in the fifth column in Table 1. The different values of Δp were found by taking p_m to be 29.928.

TABLE 1.—*Montego Bay, August, 1903.*

Day and hour.	p	Δp	Wind.	r	Δp Computed.
	Inches.	*Inches.*	*M. p. h.*	*Miles.*	*Inches.*
10th, 6 p. m.	29.837	0.09	3	305	0.11
11th, 6 a. m.	29.686	.24	10	65	.24
11th, 7 a. m.	29.609	.32	20	45	.29
11th, 8 a. m.	29.520	.41	50	25	.39
11th, 8:15 a. m.	29.478	.45	60	20	.45
11th, 8:30 a. m.	29.427	.50	60 to 80	15	.52
11th, 8:45 a. m.	29.331	.60	60 to 80	10	.67
11th, 9 a. m.	29.16	.77	60 to 80	5	*0.77
11th, 9:15 a. m.	28.93	1.00	0	0	....

*Measured along the tangent to the curve.

In order to plot the curve showing the connection between Δp and r, take a scale of 40 divisions to an inch, let each division represent a mile along the horizontal line, and let each division represent 0.01 inch of Δp down the vertical line.

In fig. 1, Plate I, the dots surrounded by small circles show the observed values of Δp, while the curve is drawn among them with a free hand.

From the smooth curve we have,

r	Δp
80	0.22
60	0.25
40	0.32
20	0.45

and then from equation (1) we have, approximately,

$$a = +2$$
$$c = 1.9.$$

To solve the equations by the method of least squares would be a waste of time; the nature of the work permits only approximate values. From these values of a and c, Δp was computed, and the results given in the last column of Table 1.

The close agreement between the observed and computed values of Δp shows that equation (1) suits this particular cyclone.

It will be noticed that Δp leaves the curve when r is about 5, Δp about 0.77, and the wind blowing a hurricane. For values of r less than this, or even less than 10, equation (1) gives values of Δp absurdly large. The tangent is drawn through 1.05, the lowest pressure.

As a second example let us take the Jamaica cyclone of August 20, 1886. It passed centrally over Kingston, along a line joining Kingston and Montego Bay, at the rate of twelve miles an hour; but near Montego Bay it turned northward. (Jamaica Weather Report No. 69). The effects of the small, secondary cyclone near St. Anns Bay were entirely local; it did not perceptibly affect the barometer at either Kingston or Montego Bay. (See Table 2.)

The different values of Δp were found by taking p_m=29.914. The lull at the center lasted for about half an hour, from 3:30

to 4:00 a. m.; but as the center did not pass exactly over the place of observation, we must avoid small values of r.

TABLE 2.—*Kingston, August, 1886.*

Day and hour.	p	Δp	Wind.	r	Δp computed.
	Inches.	*Inches.*	*M. p. h.*	*Miles.*	*Inches.*
19th, 7 a. m.	29.773	0.14	3	246	0.13
19th, 3 p. m.	.745	.17	3	150	0.17
19th, 11 p. m.	.618	.30	6	54	0.31
19th, 12 midnight	.498	.42	12	42	0.37
20th, 1 a. m.	.418	.50	35	30	0.51
20th, 2 a. m.	.257	.66	60	18	*0.65
20th, 3 a. m.	.159	.76	40	...	*0.81
20th, 3:30 a. m.	29.123	0.79	0	...	*0.90

*Measured along the tangent to the curve.

From the smoothed curve (see fig. 2, Plate I) we have

r	Δp
140	0.17
60	0.27
30	0.50

whence $a = +16$, $c = 1.9$ and thence the computed values of Δp in Table 2.

It will be noticed that Δp left the curve when r was about 30, and the wind not more than 35 miles an hour. But Kingston is sheltered from winds from the north, and this wind-velocity may be too small in consequence.

We shall use these values of a and c for the same cyclone, when approaching Montego Bay. (See Table 3.)

TABLE 3.—*Montego Bay, August, 1886.*

Day and hour.	p	Δp	Wind.	r	Δp computed.
	Inches.	*Inches.*	*M. p. h.*	*Miles.*	*Inches.*
19th, 7 a. m.	29.782	0.13	0	329	0.11
19th, 4 p. m.	29.778	.14	0	221	.13
19th, 7 p. m.	29.753	.16	28	185	.15
19th, 11 p. m.	29.716	.20	23	137	.17
20th, 2 a. m.	29.688	.23	34	101	.21
20th, 4 a. m.	29.667	.25	34	77	.24
20th, 7 a. m.	29.622	0.29	23	41	0.38

The distance between Kingston and Montego Bay is 83 miles. After 7 a. m. of the 20th some great change occurred; the cyclone swerved on its course, which was no longer a straight line.

Let us take as a last example the destructive cyclone of October 29, 1867, which passed in a straight line centrally over the harbor of the small island of St. Thomas, in the West Indies. Prof. J. R. Eastman, U. S. N., made a report on this cyclone, and the data for Table 4 are taken from that report, published at Washington, in 1868, in the annual volume of the U. S. Naval Observatory.

TABLE 4.—*St. Thomas, October, 1867.*

Day and hour.	Barometer.	Δp	Wind.	r	Δp computed.
	Inches.	*Inches.*		*Miles.*	*Inches*
29th, 7 a. m.	29.76	0.20	....	98	0.20
29th, 8 a. m.	29.75	.22	....	82	.22
29th, 9 a. m.	29.73	.26	....	68	.24
29th, 10 a. m.	29.72	.27	....	52	.28
29th, 11 a. m.	29.69	.28	....	38	.33
29th, noon	29.64	.31	Hurricane.	22	.48
29th, 1 p. m	28.86	1.06	....do	8	*1.02
29th, 1:30 p. m.	28.50	1.42	Calm	0	*1.47

*Measured along the tangent to the curve.

The above barometric readings were further corrected for diurnal variation and standard gravity, whence p and then Δp were found by taking $p_m = 29.88$.

The velocity of the center along its westerly course was 15 miles an hour; the calm at the center lasted half an hour, and the wind blew with hurricane force for an hour and a half before the passage of the central calm, and for an hour after.

It is more difficult to deduce a and c for this storm than for the two preceding ones; however, adopting

$$a = +6$$
$$c = 1.9$$

we have Δp in the last column of Table 4.

Table 4 and its corresponding figure (fig. 3, Plate I) are very remarkable; the fall before noon was very small, and the fall during the following hour and a half very large. It will be noticed that the gradient here is no greater than in the first figure, and probably the wind was no stronger, 60 to 80 miles an hour, in gusts; and when Mr. T. H. Jahnecke stated that the wind rose to 74 miles an hour his estimate was probably correct as an average.[1]

We shall measure gradients by the fall of pressure in inches of mercury per mile toward the center. But in the above figures the vertical scale was taken to be a hundred times the horizontal scale according to the adopted units, an inch and a mile. So that if φ be the angle the tangent at any point of the curve makes with a horizontal line through the point, the

$$\text{gradient} = \frac{\tan \varphi}{100}.$$

Thus in fig. 1 the limiting value of φ is 81°, and the limiting gradient 0.063; in fig. 2 the limiting values are $54\frac{1}{2}$° and 0.014; and in fig. 3 the limiting values are 80° and 0.057.

The rate of fall of pressure, or the fall of p per hour, should be taken from a series of readings if possible. Thus from Table 1 we have:

	P.	*Diff.*
August 11, 1903, 6 a. m.	29.686	
		0.077
August 11, 1903, 7 a. m.	29.609	
		0.089
August 11, 1903, 8 a. m.	29.520	

By taking the mean of the two differences we have 0.083 as the rate of fall at 7 a. m.

We can now show that equation (1) is of some use even at an isolated station. Suppose a cyclone should generate 900 miles away from the station; then, assuming $c = 2$ and neglecting a, the fall of pressure below mean will be 0.067. Suppose next day the cyclone has approached to 530 miles; then the fall below mean will be 0.087. Consequently for two days or so the pressure will be about 0.08 below the mean, no other change having taken place.

I have often called attention to this rather sudden drop in the barometer as a most valuable wireless message from the cyclone to put the observer on his guard. As the cyclone approaches, clouds, wind, and the continued fall of p supply the observer with information; and perhaps the following considerations may aid him.

If the center is advancing along a line drawn through the center and the place of observation, we have,

$$\text{Gradient} = \frac{\text{rate of fall at observatory}}{\text{velocity of center}};$$

or in the notation of the differential calculus,

$$\frac{dp}{dr} = \frac{\frac{dp}{dt}}{\frac{dr}{dt}} \qquad (2)$$

But from (1)

[1] There was great loss of life; 60 or 70 vessels were driven ashore or sunk at their moorings, including the Royal Mail steamship *Rhone* and the West India and Pacific steamship *Columbian*. The latter arrived an hour before the storm with a full cargo from Liverpool and sank in seven fathoms of water. The *Rhone* was the transatlantic steamer which in those days used to meet all the intercolonial steamers at St. Thomas; as she was sinking her boilers exploded and 160 persons on board lost their lives.

$$\frac{dp}{dr} = \frac{c}{2(r-a)^{\frac{3}{2}}} = \frac{\Delta p}{2(r-a)}$$

and substituting for $\frac{dp}{dt}$ we get

$$\frac{r-a}{\frac{dr}{dt}} = \frac{\Delta p}{2\frac{dp}{dt}}$$

But, neglecting a, the left hand term in this equation is the time in hours that the central calm will take to reach the station; so that,

$$\text{Time of arrival} = \frac{\Delta p}{2\frac{dp}{dt}} \tag{3}$$

In words, *the time of arrival is the fall below mean divided by twice the rate of fall.*

If, therefore, we find that our series of observations agree in indicating the same time of arrival, there can be no doubt but that the cyclone is directly approaching.

As an example of equation (3), we have already seen that by Table 1, $\frac{dp}{dt}$ was 0.083; and as Δp was 0.32 at that hour, the computed time of arrival is 9 a. m., which is quite correct.

In order to add to this series of cases, let us take the cyclone which passed over Kingston, Jamaica, August 18, 1880. This was before the weather service was established there, so that Kingston was really an isolated station. The cyclone approached from the Windward Islands, and, according to the chart in Meteorological Observations, Vol. I, the cyclone center was not directly approaching till noon, when it turned on its course and made straight for Kingston.

TABLE 5.—*Kingston, August 18, 1880.*

Hour.	p.	Δp.	r.	Δp computed.	$\frac{dp}{dt}$	Time of arrival, as computed
	Inches.	*Inches.*	*Miles.*	*Inches.*	*Inches.*	
7 a. m.	29.782	0.14	256	....	....	....
9 a. m.	29.744	0.18	220	....	0.017	2:00 p. m.
11 a. m.	29.714	0.21	184	....	0.014	6:30 p. m.
1 p. m.	29.687	0.24	148	0.22	0.012	11:00 p. m.
3 p. m.	29.666	0.26	112	0.26	0.022	9:00 p. m.
5 p. m	29.597	0.32	76	0.32	0.060	8:00 p. m.
7 p. m	29.428	0.49	40	0.49	0.181	8:30 p. m.
9 p. m	28.874	1.05	4¼	*1.05	....	....

* Measured along the tangent to the curve.

The velocity of the center was 18 miles an hour, and p_m was taken to be 29.922.

The computed times of arrival before 3 p. m. are irregular; this shows that the center was *not* directly approaching. The times subsequently agreed, which shows that then the center *was* directly approaching. The time of arrival computed by equation (3) was 8:30 p. m. and the calm center actually arrived at 9 p. m.

From noon onward, then, equation (1) should hold good, and we easily find

$$a = +12$$
$$c = 2.6$$

whence result the computed values of Δp given in Table 5, and in fig. 4, Plate I, in which the limiting values of φ and the gradient are 57° and 0.015.[2]

We will now consider the case of two stations in the Tropics, on the line of usual approach of hurricanes, and connected by telegraph.

Let Δp be the fall below mean at the station nearer the hurricane at the time t; and let t' be the time at the further station when the fall below mean reaches the same value Δp; then if D be the distance between the two stations in miles, the hourly velocity of the center toward the stations will be

$$\frac{dr}{dt} = \frac{D}{t'-t} \tag{4}$$

when the interval $(t'-t)$ must be expressed in hours and decimals of an hour.

Equation (4) is, of course, independent of (1), and holds good for any relation between Δp and r, provided that Δp increases as r decreases.

Hence, by the mutual exchange of barometer readings by telegraph, each station may come to know $\frac{dr}{dt}$, and hence predict the time of arrival of the center.

Take for example the cyclone of 1886 (Tables 2 and 3). At 7 a. m. on the 19th Δp at Kingston was 0.14; but Δp did not reach 0.14 at Montego Bay until 4 p. m. And as $D = 83$ miles, we have $\frac{dr}{dt}$ = velocity of center = 9 miles an hour.

Similarly for $\Delta p = 0.17$, we get $\frac{dr}{dt}$ = velocity of center = 17 miles an hour. The mean of these two computed values is 13, while the true observed value was taken as 12 miles per hour.

Again, as each station can, from its local observations, also find its own $\frac{dp}{dt}$, or rate of fall at any instant, it follows from (2) that by the exchange of telegrams, each station can calculate its own gradient at the given instant, or $\frac{dp}{dr} = \frac{dp}{dt} \Big/ \frac{dr}{dt}$, quite free from any theory.

Consequently each station can compute its

$$r = \frac{\Delta p}{2\frac{dp}{dr}} \tag{5}$$

In words, the distance of the calm area at any time is the fall below the mean divided by twice the gradient.

Thus for the storm of 1903, at Montego Bay, we have found that $\frac{dp}{dt}$ was 0.083 at 7 a. m., but as $\frac{dr}{dt}$ was 20, therefore, $\frac{dp}{dr}$ was 0.00415; and by equation (5)

$$r = 40.$$

The true observed value was 45, or thereabouts.

There is no need to proceed any further at present with the mathematical part of this investigation, but I think that much valuable information might be obtained by the discussion of a large number of tropical cyclones on the plan indicated in this article. We want to know more about a and c, and when and why Δp breaks away from the curve and follows the tangent.

As to the practical part of this inquiry, I do not know that observers can do better during the approach of a cyclone, while waiting for time to pass and further exchange of telegrams, than to put their observations into the forms indicated above. Equation (3) has often saved me anxiety, and I have been able to send the second reassuring general telegram, "not coming our way," after the first general warning to the islands had been issued some hours previously.

ON THE CONDITIONS DETERMINING THE FORMATION OF CLOUD-SPHERES AND PHOTOSPHERES.

By ARTHUR W. CLAYDEN, M. A.

[From the Monthly Notices of the Royal Astronomical Society, December, 1905.]

In the course of an investigation of the conditions under which clouds may be formed in our own atmosphere certain considerations presented themselves which seem equally ap-

[2] This small gradient is surprising, as to my own knowledge the wind reached full hurricane force.

plicable to the conditions which determine the position of a stellar photosphere in the mass of a star.

As the spectrum of a star is to a great extent dependent upon the position of the photosphere it seems possible that a survey of these points may help to clear up some of the difficulties attending the interpretation of spectral details.

To begin with it is necessary to ask that it may be taken for granted—

1. That the photosphere of a star is the upper surface of a stratum of clouds.
2. That those clouds are caused by the condensation of some substance from the state of vapor to that of small solid or liquid particles.
3. That the condensation is due to cooling produced by expansion brought about by the ascent of vapor-charged convection currents.
4. That the cooling effect of expansion follows the same general thermodynamic law as is the case in our own atmosphere.

It is true that under the high pressures and temperatures of a star the gradation of temperature may be considerably modified. The transference of heat from one stratum to a higher by conduction and radiation should tend to equalize temperatures, but the increased viscosity due to pressure should tend in the opposite direction. Hence, a curve showing the relations of temperature and pressure is not likely to differ very greatly from one plotted in accordance with the expression

$$\frac{\log t - \log t'}{\log p - \log p'} = \frac{\gamma - 1}{\gamma}$$

in which t is the absolute temperature at a pressure p, and t' is the absolute temperature at the reduced pressure p'; γ is, of course, the ratio of the two specific heats.

In order to argue from the known to the unknown, let us first consider the case of planetary bodies surrounded by an atmosphere consisting wholly of water, a substance whose temperature-pressure relations are well understood.

At temperatures far below freezing point ice gives off vapor which exerts a certain maximum pressure. As the temperature rises this maximum pressure increases more and more rapidly. This goes on until 365° C. is reached, at which point the maximum pressure is 200.5 atmospheres. If at any temperature the pressure be less than the maximum, evaporation will take place; and, conversely, if the pressure exceed the maximum, condensation will follow until the pressure is reduced to that value.

We can then plot a curve (fig. 5, Plate I) showing the maximum pressures for all temperatures. Let this be done, taking temperatures as abscissæ and pressures as ordinates.

We find the curve rises at first very slowly, and at 100° C. it shows a pressure of one atmosphere. It then turns upward more and more rapidly until it reaches 365° C. and 200.5 atmospheres. This is the critical point, and if the temperature be higher no increase of pressure can possibly bring about liquefaction. The curve may be regarded as giving the pressures and temperatures of condensation. If, then, the pressure is greater than 200.5 atmospheres, condensation will be effected at the critical temperature. The curve must therefore turn vertically upward.

Let us now assume that the masses of atmosphere and planet are such that the pressure on the solid surface is 250 atmospheres, and that this surface has a temperature of 400° C. No liquid water can exist on such a surface, but condensation will occur at a certain height.

If the curve of decreasing temperature be plotted, using the expression quoted and giving to γ the proper value for water vapor—namely, 1.3—it will be found that this curve will cut the condensation line very near the critical point, at which temperature and pressure cloud-production will begin.

Suppose, next, that the surface temperature is increased to 500° C. If a similar curve be now plotted, it will be found to cut the condensation line at about 50 atmospheres and a temperature of only 260° C.; that is to say, the effect of increasing the surface temperature of the planet is not only to drive the cloud level farther up in the atmosphere, but to lower the temperature at which its formation begins.

Again, suppose the surface temperature to be 400° C., but the pressure only 50 atmospheres. The curve then cuts the condensation line at about 160° C. and a pressure of less than 10 atmospheres.

It thus appears that the result of suitably diminishing the mass of a planet may be to produce exactly the same effect upon any cloud sphere, by which it is surrounded, as would be brought about by increasing the temperature, or that a hot planet of large mass might present exactly the same features as a cooler and smaller one.

If we imagine the planetary atmosphere to contain other noncondensible gases, this will not affect the conclusions. The changes due to alterations of temperature and pressure will still be in the same direction, and the diagram will serve equally well if we remember that it relates only to the pressures and temperatures of the water vapor present. The actual pressures in the whole atmosphere could be computed by calculating them for the other substances and adding those values.

An inspection of fig. 5, Plate I, shows that no cloud sphere could possibly have a higher base temperature than 365° C. This is one point worth noting.

Next it is evident that if our eyes were so constituted that we could see the radiations emitted from the outer surfaces of such cloud spheres, they would become true photospheres, and if the distances were great enough we should see these supposed planetary bodies as star points. If two of them had their cloud spheres at similar positions in their atmospheres, they should present similar spectral features. We should then class them together, although they might really owe their apparent similarity to their true diversity.

Finally it is obvious that a determination of the temperature of the outer surface of the cloud sphere would be no measure whatever of the temperature of the solid planet beneath.

It is not necessary to point out that these conclusions have an important bearing on the cloud spheres surrounding the actual planets.

It seems only reasonable to attempt to apply them also to the stars.

Now it is not necessary to make any assumption as to the nature of the substance which makes up the cloud particles of a stellar photosphere, nor as it necessary to assume that all photospheres are due to the same body. Whatever the substance concerned its condensation curve would probably present features similar to those of all bodies for which the requisite data are obtainable.

The argument, however, will be clearer if we start with the assumptions that all photospheres are due to the same substance, and that that is the element carbon. It will be easy later on to briefly consider other possibilities.

We have no measurements of the vapor pressures of carbon, but there seems some reason to think, from the phenomena of the electric arc, that the vaporization temperature under one atmosphere pressure is about 3770° absolute.[1] This, then, will correspond to 373° absolute, the boiling point of water under one atmosphere.

If we can get some idea as to the critical temperature we can then draw a curve resembling the known curve for water,

[1] 3770° A is the same as 3497° C. 373° A. = 100° C. We shall use the abbreviations A. and C. in this sense.—EDITOR.

and feel tolerably sure that our proceedings are reasonable. Messrs. Wilson and Gray estimated the temperature of the solar photosphere at 6900° C. (7173 A.), but this is the upper surface of the cloud stratum, which must be cooler than the base. Hence, if we take 7200° A. as the critical temperature we can feel sure that we are at least within the mark, and may be a long way within it.

The difference between 3770° and 7200° A. is about thirteen times as great as that between 373° A. and the critical temperature for water. Hence, if the condensation curve for carbon is similar to that for water the critical pressure should be about 2600 atmospheres. If we connect the two points thus fixed by a curve resembling that for water it will serve our purpose, since neither the exact temperatures nor pressures are material to the issue, which rests only on the supposition that the vapor pressures and temperatures for the photospheric substance can be represented by some curve of the usual type.

Let us draw the curve, and again, for simplicity, consider only the pressures due to the carbon vapor.

Before drawing the curves to represent the changes of temperature and pressure in the stellar mass we are confronted with another unknown—namely, the value to be assigned to γ. According to the determinations of this quantity yet made, it appears that elementary bodies whose molecules are monatomic give a value 1.66; those whose molecules are diatomic give 1.4 to 1.3; while polyatomic molecules give values decreasing with the complexity, but always greater than unity. At stellar temperatures it seems unlikely that there will be polyatomic molecules, so that if we take 1.5 as a working value we shall not be far wrong. Moreover it will soon be evident that a change in the value of γ will in no way affect our general conclusions, but will only modify the numerical examples which serve the purpose of making the argument clearer.

Let us now imagine six stars in which the pressure of 10,000 atmospheres is reached at 8,000°, 10,000°, 11,850°, 14,950°, 21,500°, and 500,000° A., respectively. Plot the curves of descending temperature and pressure as we pass outward as before. (See fig. 6, Plate I.) The results may be tabulated thus:

Temperature at p=10,000 atmospheres.	Condensation.	
	Pressure.	Temperature.
° *A.*	*Atmospheres.*	° *A.*
8,000	7,400	7,200
10,000	3,850	7,200
11,850	2,150	7,050
14,950	730	6,250
21,500	130	5,250
500,000	30?	4,400

The table shows that if the initial pressure be far above the critical, the result of increasing the initial temperature is to drive the photosphere into regions of diminished pressure. So long as the pressure of condensation is above the critical, the temperature at which condensation begins remains unaltered; but as soon as this point is passed, and the curved part of the condensation line is reached, the temperature at which the clouds are formed begins to fall; that is to say, the effect of raising the internal temperature is to drive the photosphere farther *out, and to cool it.*

Again, let us imagine that a temperature of 10,000° A. is found with pressures of 10,000, 8,000, 6,000, 4,000, 2,000, and 200 atmospheres, respectively, and tabulate the results as before.

The sequence of changes is exactly similar, and the conclusion is that, if the initial temperature is constant, decrease of pressure will produce the same effect as increase of temperature.

Initial pressure, t=10,000° A.	Condensation.	
	Pressure.	Temperature.
Atmospheres.	*Atmospheres.*	° *A.*
10,000	3,850	7,200
8,000	3,050	7,200
6,000	2,150	7,050
4,000	1,150	6,550
2,000	420	5,850
200	30?	4,400

Now the pressure at any point is determined by gravity and the mass of the superincumbent gases. It therefore appears that no carbon photosphere can have a higher temperature than the critical, and that the hotter photospheres must be those most deeply seated or surrounding the most massive stars.

Deep seated photospheres must mean heavy absorption, high photospheres little absorption.

Inspection of the diagram reveals a number of interesting points, and it is easy to see how the spectra of stars should be modified by altering the ratio of temperature and pressure. Call this $\frac{T}{P}$.

Let us at the outset give this expression a very high value, so high as to make the curve on the scale of our diagram raised very little above the line of no pressure. Such a star would have no photosphere. If the temperature were suitable, small particles of incandescent carbon would be dispersed here and there in a thin mist at a high level. They would be unable to hide the radiation from gases at lower levels or to reverse the light from those among which they were spread. Such stars would be bright-line stars in which the lines would be mixed with a faint continuous spectrum, which would begin with a dim radiance in the yellow-green.

As we reduce the ratio $\frac{T}{P}$ the dim radiance will spread and brighten, since condensation under higher pressure means a higher temperature. The mist stratum of the bright-line star should then pass through denser stages into the condition of a discontinuous stratum of bright photospheric clouds, still high up, though lower than before. The bright clouds will be overlaid by those gases which lie highest, giving a spectrum showing the dark lines due to absorption. But with a discontinuous stratum of cloud there must be convection. Rising currents will make the clouds, descending currents the interspaces. The light, then, from the descending spaces should be bright lines corresponding with those which are reversed above the clouds.

If we now bear in mind the fact that a star spectrum is an integration of the whole light from the stellar surface, it is easy to see that the bright-line spectrum may be brighter than the continuous; it may be equally bright or it may be less brilliant. If the convection movements were slow the respective results would be: bright lines on a continuous background, a continuous spectrum alone, or a simple absorption spectrum. It is, however, not likely that all the lines would behave alike, and the result should generally be a white or helium star showing some lines bright and others reversed.

If we may suppose the convection currents sufficiently rapid, then the bright lines due to descending currents should be shifted toward the red, while other bright lines from deeper layers might be undisturbed. We should then have some bright lines fringed on their more refrangible sides by dark companions.

Decreasing the ratio still further the spaces between the cloudlets will close up until we have the complete helium star.

Further progress will yield a yet brighter and hotter photosphere, sinking step by step beneath stratum after stratum of

gases. As the background gets brighter, helium absorption, having little intensity, becomes less and less obvious. Hydrogen absorption, on the contrary, becomes more and more extensive, until it in turn becomes secondary to the absorption due to metallic vapors.

The curves showing the temperature and pressure at which condensation takes place indicate steadily rising pressure, and rising temperature (and, therefore, intrinsic brightness) until the critical point is reached. From this point no further change in $\frac{T}{P}$ can alter the temperature of the photosphere. As it sinks lower and lower the density of absorption increases. If the metallic-line spectrum of the sun may be supposed to be formed under the conditions represented by the curve *S*, on passing to the next cooler line we might have the denser absorption of *Arcturus*.

If the ratio $\frac{T}{P}$ be still smaller we come to the curve *A*. Here the photosphere is still deeper. The outer parts of the superincumbent gases are much cooler, and compound vapors may be formed. If so, we should expect that the absorption should consist of metallic lines, flutings, and general absorption of the kind known as smoke-veil, for instance, *α Orionis* and *Antares*.

Continuing the process, such a spectrum should grow in intensity until the light of the photosphere should be hidden by superincumbent vapors, or even nonluminous clouds formed by condensed metals and compounds. The last glimpse of the incandescent depths should be a dull red glow.

Such, then, seems to be the normal history of a star.

There is, however, a special case.

Suppose $\frac{T}{P}$ is very high, but that its large value is due to extreme heat, and that P is itself large.

The result should be a very dense gaseous nucleus which should give a continuous spectrum, and therefore act as a deeper-seated photosphere whose light would be veiled by absorption, in which that due to carbon vapor would be a conspicuous feature; but metallic lines would also be present, and if the absorption were great, or the intrinsic brightness of the continuous spectrum small, some of the strong metallic lines would stand out as bright lines—carbon stars. Such stars should pass through the normal sequence as a result of declining temperature, which may explain the former redness of *Sirius*.

It thus appears that bright line white stars should be associated with nebulæ; that white stars being due to the greatest range of conditions should be most numerous, especially among the smaller stars; that solar stars should be next in order of frequency, and should form a larger proportion of the massive stars; that stars with fluted spectra should be comparatively few in number, and should as a rule be massive. Finally, carbon stars, demanding exceptionally high pressure and temperature, should therefore be rare and vast.

There are several other deductions which may be drawn. First, if a binary is formed by the fission of a single star, and the division is equal, both stars should be white, or both solar, or beyond. If unequal, and differing to a sufficient extent, the smaller would adhere to a Sirian spectrum long after the larger and less cooled had passed into the solar stage or beyond; as, for instance, *β Cygni*.

Second, any determination of the temperature of the photosphere is no guide to the temperature of the star center, neither is the position of the photosphere, as shown by the absorption, much help. It is possible to have a large hot star showing exactly the same spectrum as a much smaller and cooler one. The ratio $\frac{T}{P}$ may be identical.

So far it has been assumed that carbon is the cause of all photospheres. It is, of course, possible that different stars may be differently constituted, and that different elements may play similar parts. But all the evidence of the spectroscope indicates a cosmic distribution of the elements best known to us. Moreover, a moment's thought will show that all that has been said in reference to a carbon photosphere will apply with equal force to any substance whatever. If, then, we can have photospheres formed of some heavier atoms, they should be situated deeper in the mass of the star, and should be overlaid by carbon, which should either form a higher photosphere in turn or should betray its presence by absorption. We ought, then, to have as great a variety of carbon stars as we have of other types. The fact of the rarity of carbon stars is one of the strongest evidences that it is preeminently *the* photospheric element. However this may be, the main conclusions here set forth remain unaffected, because they hold good for any substance which forms a photosphere, granting only the four postulates with which we started, and that this substance behaves like all others whose condensation curves are known.

THEORY OF THE RAINBOW.[1]

By Prof. W. LECONTE STEVENS, Washington and Lee University. Dated Lexington, Va., May 25, 1906.

This pamphlet by Doctor Pernter is an attempt to put the complete theory of the rainbow into such form as to involve no application of higher mathematics, especially no application of calculus, and thus to render it suitable for development in the instruction of students who are below the grade of the university or the advanced college class.

To an American teacher, familiar with the limitations found universally in American schools and colleges, the examination of such a paper at once raises the question whether such a demonstration could find a place in any prescribed course in physics in an American college. If not, it would be included in an elective course. This assumption in turn raises the question whether such a subject would probably be attacked voluntarily by any student not already in possession of such elementary knowledge of calculus as to prepare him for the many difficulties that are sure to arise if the study of optics is pursued beyond its elementary stage. Gymnasial instruction in Austria is conducted under conditions somewhat different from those of college instruction in America. The fact that interchange of conditions is not possible, and that Pernter's work would quite surely meet with little appreciation here, does not in any way diminish the merit of what he has done, even if the critical reader is compelled to think that the adaptation to secondary schools is very imperfect on account of the inherent difficulties of the subject.

Pernter begins with the statement that in all schools, high and low, the correct theory of the rainbow is wholly ignored, and that everywhere the "incorrect Descartes's theory of effective rays" (wirksamen Strahlen) is taught, "as if the correct explanation of the rainbow had never been given by Airy". The task which he undertakes is that of presenting the results of Airy's work in a form as simple as the nature of the subject may permit.

At the outset, therefore, it is necessary to dissent from the author's assumption. A geometric theory may be incomplete without being incorrect. From the days of Noah the conditions under which the rainbow appears have been observed and generally known. That light is reflected and refracted at the bounding surface between air and water, was familiar to Ptolemy, but the law of refraction was not discovered until 1621 by Snell. Its correct formulation and publication was subsequently made by Descartes, who died in 1650. Ten

[1] Ein Versuch der richtigen Theorie des Regenbogens Eingang in die Mittelschulen zu verschaffen. Von Dr. J. M. Pernter. Wien, 1898. Selbstverlag.

years before Snell's discovery, Antonio de Dominis showed that one reflection and two refractions of light in drops of rain were sufficient to explain the production of a luminous arc in the sky opposite the sun. Descartes gave exactness to the explanation of Dominis by the application of Snell's law. Descartes's work was correct, and the recognition of his "effective rays" does not in any way contravene the subsequent discoveries of Grimaldi, Newton, Huyghens, Young, and others that are now applied in the discussion of the rainbow. Descartes seems to have thought that refraction produced color instead of separating colors; but it was reserved for Newton, sixteen years after Descartes's death, to discover that each hue has its own index of refraction when white light traverses a given medium. Descartes's geometric theory is true whatever may be the hue or index of refraction, but it was insufficient to account for the supernumerary colored bands or alternations of brightness which may be often seen as accompaniments to the rainbow. Young was the first to propose, in 1804, an explanation of these based on the wave theory. His suggestion was afterward confirmed and extended by the mathematical investigations of Potter and Airy about 1835; but this important supplement to the work of Descartes and Newton was in no sense contradictory. The phenomena of diffraction and interference may coexist with those of refraction; and this, indeed, is at times apparently assumed by Pernter, despite his introductory condemnation of "die unrichtige Descartes'she Theorie."

It is probably correct to say that in most, if not all, of the elementary text-books the explanation of the rainbow is limited to the application of the laws of geometrical optics, with no reference to the modifications necessitated by the wave theory of light. The great majority of students who receive baccalaureate degrees have no knowledge of such modification. The subject of rainbows receives scant attention ordinarily, and in such an admirable modern text-book as Drude's Theory of Optics it is not even mentioned. But in Preston's Theory of Light a good discussion may be found, in which the reader is assumed to possess all the mathematical knowledge that the subject naturally suggests. Professor Hastings, in America, has given an excellent discussion in Hastings and Beach's Physics. The pamphlet by Pernter is noteworthy as an attempt to emphasize the importance of the wave theory. His strenuous arraignment of the schools for teaching what is insufficient, rather than incorrect, is perhaps a pardonable exhibition of zeal which should not be taken too seriously.

The theory of the rainbow is best developed by a succession of approximations, beginning with purely ideal conditions.

FIRST APPROXIMATION.

Let a sheaf of parallel rays meet a sphere of glass or water. Consider only those impinging at a single angle of incidence, i, such as 60°. Let μ be the mean index of refraction, μ' that for red, and μ'' that for violet. From Snell's law the angles of refraction, r, r', r'', are readily calculated, and the mean deviation is $i-r$. At the first point of incidence, A (fig. 1, Plate II), some of the light is reflected externally and some refracted to B. Here some is reflected internally, but much more emerges with additional mean deviation, $i-r$. The total mean deviation, δ, is thus

$$\delta=2\,(i-r). \qquad (1)$$

For the extreme rays we have

$$\delta'=2\,(i-r') \text{ for red;}$$
$$\delta''=2\,(i-r'') \text{ for violet.}$$

Hence a screen properly placed would receive a circular spectral band of width $\delta''-\delta'$. If the globe be of glass, and $i=60°$, as shown, the mean angular diameter, $2\,\delta$, for the circular bow would be about 100°.

This is easily projected experimentally by restricting the light to a suitable angle of incidence on a glass sphere, or by using a glass cone of proper angle, with its vertex toward the source of light. The bow thus produced is the most brilliant possible.

SECOND APPROXIMATION.

A bow of the kind just described, though always produced, would not be perceptible in the sky, because the refracting sphere and the sun are too nearly in the same direction from the receiving eye. For a visible bow we must consider the rays emergent after one or more internal reflections.

On reaching the reflecting surface B, (fig. 2, Plate II), the change of direction by reflection is obviously $\pi-2\,r$. For each one of n internal reflections the total deviation of the mean ray is thus

$$D=2(i-r)+n(\pi-2\,r). \qquad (2)$$

For a single internal reflection the emergent mean ray would be received by an eye at O at an angular distance $\pi-D$ from the original direction, and to such an eye all drops of water at this angular distance would appear of the same hue. Assuming $i=60°$ the angular distances for the extreme rays are thus readily calculated and found to be about 42° for red and 40° for violet. A spectral bow, with angular width of 2°, would hence appear in the eastern sky upon a cloud, if the afternoon sun is not obscured. The arch would be lined with red on its outer border and violet on the lower side.

For two internal reflections a similar applications of equation 2 may be made with $n=2$. The result is that a second, but fainter bow may be produced, with angular width of about 3°, the angular distances for the extreme rays being about 51° and 54°, with red on the lower side and violet on the outer border.

For more than two internal reflections the emergent light is so reduced in brightness, or is so directed, as to be almost if not quite imperceptible Often only the primary bow is seen. One or both bows may be seen as complete circles in the spray of a fountain or cascade under favorable conditions.

THIRD APPROXIMATION.

Thus far we have assumed but a single value, 60°, for the angle of incidence on a drop while in reality this takes all values from zero to 90°. For nearly perpendicular incidence the proportion of light reflected is very small, and the value of D for a single internal reflection is then given by equation 2 as nearly 180°. For nearly grazing incidence the proportion externally reflected is large, hence very little is returned by internal reflection; and the value of D for a single internal reflection, when $i=85°$, is given by equation 2 for red light as 156° 36′. Under the same condition for $i=60°$ the equation gives $D=137°\ 56'$. This is less than either of the preceding values, while the proportion of light refracted and internally reflected is much greater. The internally reflected rays are thus crowded about some mean ray that gives a minimum value of D, and these are Descartes's "effective rays". A simple application of calculus to equation 2 makes it possible to find the value of i corresponding to this minimum value of D, and thus to compute D. For red light it is $i=59°\ 24'$, and $D=137°\ 54'$, which is the supplement of 42° 6′ the angular distance of the red border of the primary bow from the axial line passing through the observer's eye from the sun. Since most of the emergent light corresponds approximately to this angle, but is not confined to this value of i, it follows that the entire area within the primary rainbow will receive some light, but none will be deviated beyond the outer margin of the red.

Similar reasoning may be applied to the secondary bow with the result that the region exterior to it will be slightly illuminated while that on its concave side receives none of its scattering rays. The area between the primary and secondary bows is hence that of minimum illumination while the adjacent primary bow is that of maximum illumination. The two bows are separated by a distinctly dark band.

The experimental test of what has just been set forth may be readily made with a spectrometer. At the center is erected a small glass cylinder, this substitute for a sphere being selected because the measurements are restricted to a horizontal plane. The index of refraction being known and the angle of incidence being controllable, the deviations for the different hues are calculated by use of equation 2. A beam of white light is transmitted through a narrow vertical slit and made parallel by the collimator. By suitable shifting of the observing telescope the values of D found by experiment are compared with the indications of theory. If any errors or additional phenomena are discovered the investigation of these is naturally suggested.

To avoid the use of calculus Pernter makes out a table of values of D for selected values of i from 30° to 85°. The results are expressed graphically and the lowest point of the curve is thus found to correspond to an angle of incidence a trifle less than 60°. For greater exactness the following trigonometric method is then given for finding the angle of incidence corresponding to minimum deviation.

By a simple transformation equation 2 becomes

$$D = n\pi + 2\Big(i - (n+1)r\Big).$$

For brevity let $p = n + 1$. Then

$$D = n\pi + 2(i - pr). \qquad (3)$$

This indicates that small alterations of i will produce diminishing alterations of D until the minimum value of D is reached. Let α denote an increment of i; let β be the corresponding increment for r, and d that of D. Then

$$D + d = n\pi + 2\Big((i+\alpha) - p(r+\beta)\Big)$$

$$= n\pi + 2(i - pr) + 2(\alpha - p\beta). \qquad (4)$$

Subtracting (3) from (4),

$$d = 2(\alpha - p\beta).$$

The condition that makes d vanish is obviously

$$\alpha = p\beta. \qquad (5)$$

If I denotes the angle of incidence when d vanishes, and R that of refraction, the index of refraction being μ, Snell's law gives

$$\sin(I + \alpha) = \mu \sin(R + \beta).$$

Expanding and reducing this equation, noting that α and β are small so that $\sin\alpha = \alpha$, $\sin\beta = \beta$, and $\cos\alpha = \cos\beta = 1$, also that $\alpha = p\beta$, we readily obtain

$$\sin^2 I = \frac{p^2 - \mu^2}{p^2 - 1} \qquad (6)$$

Using this equation Pernter makes out a table of values of I for water, and the corresponding values of R and D, for the first fifteen successive internal reflections. A similar table is then made for glass, and the results are subject to comparison.

FOURTH APPROXIMATION.

Up to this point, as has just been shown, geometrical optics without calculus is sufficient for the study of the rainbow, and this is usually the limit of the treatment applied.

Let us consider some of the rays that penetrate a raindrop at angles of incidence differing considerably from that corresponding to minimum deviation. Without sensible error we may assume 60° for the angle of incidence of the "effective rays". For comparison two other angles of incidence, 50° and 70°, may be selected, each differing 10° from 60°, and we may assume $\mu = 1.333$, corresponding approximately to orange red, or the Fraunhofer line C. We will also assume but a single internal reflection for this monochromatic light. Let SA be the ray incident at 60° (fig. 3, Plate II), $S'A'$ at 50°, and $S''A''$ at 70°. Although these incident rays are parallel, the corresponding emergent rays are readily found by equation 2 to be not parallel. For the emergent ray CE the angle of deviation, D, is 137° 54′; for $C'E'$, 139° 44′; for $C''E''$, 140° 46′. The emergent wave front is perpendicular to each of these rays. On leaving the drop CE and $C'E'$ diverge, as if they had come from some point, F, while CE and $C''E''$ converge, crossing at the point G. If P be a point on the least deviated ray, CE, about which the effective rays are most crowded, the wave front PR on the upper side of PE will be convex, while the part PQ on the lower side will be concave, toward the direction of propagation. This curvature indicates the development of phase difference on emergence, so that the mutual relation of the different components of the beam is like that of rays issuing from a diffraction grating. Interference bands of alternate brightness and darkness are hence superposed on the main sheaf of effective rays and may become plainly noticeable along its margins.

The rainbow is thus a complex result of both refraction and interference of light. We have assumed the incident rays to be parallel. But this is not strictly true. Each illuminated point on a drop of water in mid-air receives light from the whole disk of the sun, which is more than half a degree in angular diameter. The incident sheaf is hence conical. A variety of overlapping spectra are thus produced by refraction, widening the rainbow beyond the requirements of the ordinary theory, and greatly diminishing the purity of the colors observed. The extent of these disturbances depends much on the clearness or haziness of the atmosphere. In any case the illumination of the air in the direction of the sun produces an effective area with a diameter several times as great as that of the solar disk; and if this area is much charged with vapor the rainbow colors become so mixed that scarcely more than a whitish arch is distinguishable. The same disturbing influences destroy the sharpness of the interference bands just discussed. No theory of the rainbow can therefore be made to fit exactly the phenomena as ordinarily observed because we can not quite realize the assumptions implied; but under favorable circumstances the interference bands have been repeatedly traced, particularly along the inner margin of the primary bow at its upper part. They are known as supernumerary bows.

The complete theory of the rainbow thus requires a mathematical investigation of the curved wave front of the emergent rays. This was first done about 1835 by Potter. It requires also a determination of the intensity at any point receiving the light thus subjected to interference. This was done by Airy in 1836. The process is complex and leads to an integral, the values of which were calculated by Airy for a variety of wave lengths by successive approximation. No one but a skilled mathematician could be expected to understand or repeat the details of the work.

From the theory of diffraction it may be shown that the width and the degree of separation of the interference bands is increased with diminishing size of the raindrops. This may be experimentally tested with the spectrometer by the use of small cylinders of glass as media. In Pernter's discussion he describes experiments of this kind, and reaches the conclusion that the rainbows of richest color are those from water drops varying in diameter from about two-tenths to four-tenths of a millimeter. He gives an elaborate trigonometric investigation, which he ascribes to Wirtinger (Innsbruck, 1897), and by which the results of Potter and Airy are attained; but it can not be called elementary, though he claims to have greatly simplified Wirtinger's work. It covers more than six pages of rather fine print, and the majority of readers, if they have any knowledge of Potter and Airy, would perhaps be ready to admit the correctness of the results without plowing through the intricate underbrush of equations. Calculus is indeed avoided, but not with great saving of labor.

Pernter closes his discussion with an earnest appeal to all teachers in secondary schools to give in full the correct theory

of the rainbow. He regards it "an irrefusable duty" (eine unabweisliche Pflicht). All of the observed phenomena he considers as postulates of the correct theory and in contradiction to the Descartes theory of "effective rays," which he thinks should give place to that of "effective wave surfaces". He proclaims as his aim that no one henceforward should teach a false theory of the rainbow, since the means are now at hand for giving the correct theory in a way easily intelligible to school pupils (den Schülern leicht verständlichen Weise). How easy this may be, it would hardly be wise to accept on trust from one who is plainly an enthusiast. Probably the majority of physicists will continue to believe that the colors of the rainbow are due chiefly to refractive dispersion. This may be true without any disregard of the masterly work of Airy or any faulty observation of the phenomena of interference.

RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——.

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H. H. KIMBALL, Librarian.

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WEATHER BUREAU MEN AS EDUCATORS.

The following lectures and addresses by Weather Bureau men are reported:

Mr. W. T. Blythe, April 18, 1906, before the Railroad Branch of the Young Men's Christian Association, Brightwood, Ind.; also April 28, 1906, before the Indiana Association of Science and Mathematics Teachers, Indianapolis, Ind., on "The History of Meteorology and of the U. S. Weather Service".

Mr. N. B. Conger, April 29, 1906, before the Business Men's Class of Brewster Church, Detroit, Mich., on "The Weather Bureau and its Work".

Prof. H. J. Cox, March 7, 1906, before the Geological Club, University of Chicago; also March 9, before the Geographic Society of Chicago, in the exhibition room of the local Weather Bureau office, also March 20, before the Department of Science and Philosophy, Lakeview Woman's Club, on "Chicago Weather", with lantern slide illustrations.

Mr. David Cuthbertson, April 24, 1906, before the North Buffalo, N. Y., Young Men's Literary Association, on "The Workings of the U. S. Weather Bureau and its Value".

Mr. G. T. Todd, April 24, 1906, before the Men's Guild of St. Paul's Church, Albany, N. Y., on "Meteorological Instruments, Weather Maps, and Forecasting".

Mr. F. J. Walz, April 5, 1906, before the Male High School, Louisville, Ky., also April 6, before the Female High School, on "The Forecast Work of the Weather Bureau", with lantern slide illustrations.

Classes from colleges, schools, academies, etc., have visited Weather Bureau offices, to study the instruments and equipment and receive informal instruction, as reported from the following offices:

Albany, N. Y., April 11, 1906, 35 men from the local Young Men's Christian Association.

Buffalo, N. Y., April 27, 1906, a physical geography class from the State Normal School.

Charlotte, N. C., April 28, 1906, the junior physics class from Elizabeth College.

Detroit, Mich., April 13, 1906, a class from the Leggett Home and Day School.

Evansville, Ind., April 9, 1906, a section of the senior class of the Henderson, Ky., High School.

Iola, Kans., April 3 and 6, 1906, a class in physical geography from the Iola High School, in two sections.

La Salle, Ill., during the middle of April, several visits by the class in general science of the La Salle-Peru Township High School.

Little Rock, Ark., April 2, 1906, the senior physics class of the local High School.

Moorhead, Minn., April 10 and 11, 1906, the physical geography class of the Normal School, in two sections.

Pittsburg, Pa., April 16 and 17, 1906, the class in physics of the Fifth Avenue High School, in sections.

Springfield, Ill., April 12, 1906, over 150 pupils of the local High School.

Syracuse, N. Y., April 5, 1906, a class from the local High School.

MR. R. F. deGRAIN.

Mr. Reinhold Frederick deGrain, clerk of class I in the Weather Bureau, died at his residence in Washington, D. C., on April 25, 1906. Mr. deGrain, born in Marien, Werder, Prussia, July 18, 1840, came to America in 1862, and at once entered the Union Army (the avowed purpose of his immigration), and was discharged after an honorable service of three years' duration. He joined the Signal Corps in 1874, and, with the exception of about four years, served continuously in that corps and the Weather Bureau until his death. His duties in the Bureau were those of draftsman, for which he had been fitted by education in Germany. Mr. deGrain enjoyed the high respect both of his comrades in the Grand Army of the Republic, of which he had long been an active member, and of his associates in the Weather Bureau. He was buried in Arlington National Cemetery.—*J. P. C.*

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

High barometric pressure prevailed over the eastern Atlantic during the first half of April. From the 16th to 19th a disturbance moved from Portugal northeastward over continental Europe. During the last decade of the month pressure was low over the British Isles, with reported minimum, 28.98 inches, at Sumburg Head, Scotland, on the 28th. In the vicinity of the Azores the barometer was high except on the 1st, 2d, and 12th, when slight depressions were shown in that region. Over the western Atlantic there were frequent fluctuations of the barometer until the 17th, after which the pressure continued low, with a minimum of 29.00 inches at Eastport, Me., on the 24th.

The first important storm of the month in the United States occupied middle and southern portions of the Rocky Mountain and Plateau regions from the 1st to 7th, crossed the lower Missouri Valley on the 8th, the Great Lakes on the 9th and 10th, and by the evening of the 10th had united on the southern New England coast with a secondary disturbance that had developed on that date over Virginia. During the 11th the storm center moved northeastward over the Canadian Maritime Provinces. This disturbance was attended by snow in the northern Plateau and northern Rocky Mountain districts, by rain from the Pacific coast over middle and southern portions of the Plateau and Rocky Mountain districts, and, in connection with low area III, by rain generally east of the Rocky Mountains. From southern California over western Arizona, southern Nevada, and southwestern Utah, and in areas from the Mississippi and lower Missouri valleys to the Atlantic coast the rainfall was heavy, and augmented flood stages in the lower Ohio and lower Mississippi rivers and tributaries. On the 10th and 11th high easterly shifting to northwesterly winds prevailed on the New England coast.

From the 10th to 15th a disturbance moved from California to the St. Lawrence Valley. On the 10th and 11th rain fell from the Pacific coast over the middle Rocky Mountain districts, and extended on the 12th over the Missouri and middle and upper Mississippi valleys, with snow in the northern Rocky Mountain districts. During the afternoon of the 12th severe local storms were reported in an area extending from southern Kansas to northern Texas. During the 13th heavy rain and thunderstorms occurred in the lower Mississippi Valley and the rain area extended over the Ohio Valley and the upper Lake region. The rain area reached the Atlantic coast on the 14th and during the night of that date was heavy in the Middle Atlantic States.

In connection with a disturbance that moved from the British Northwest Possessions to the Maine coast from the 19th to 22d and two disturbances, secondary thereto, that appeared over the Middle Atlantic States and passed thence northeastward, rain fell in the Middle Atlantic and New England States and snow from the upper Ohio Valley over the mountains of Pennsylvania and the interior of New York and New England from the 21st to 23d, and gales prevailed along the middle Atlantic and New England coasts from the 22d to 24th. From the 22d to 24th rain fell in the Pacific coast States. From the 23d to 26th a disturbance moved from the British Northwest Possessions to Minnesota, attended on the 25th by showers and thunderstorms in the Northwestern States. From the 26th to 30th a disturbance advanced from the southeastern Rocky Mountain slope to the St. Lawrence Valley, attended on the 26th and 27th by snow and rain in Colorado, and on the 27th by thunderstorms in the lower Missouri Valley. On the night of the 26th severe local storms were reported at several points in Texas. From the 27th to the close of the month a disturbance moved from the north Pacific coast to western Kansas, attended by rain from the Pacific States to the Mississippi and Ohio valleys, and by snow at Flagstaff, Ariz.

On the morning of the 2d light frost occurred on the east Gulf and south Atlantic coasts, and on the 2d and 3d heavy frost was reported at Wilmington, N. C. From the 15th to 18th a frost-bearing cool wave advanced from the Missouri and upper Mississippi valleys to the middle Atlantic coast States, and heavy frost occurred in the mountains of Virginia and North Carolina on the 17th and 18th. On the 23d heavy frost was reported in the upper Mississippi and Ohio valleys, and on the 24th from the lower Lake region and upper Ohio Valley over the Middle Atlantic States and North Carolina,

with light frost as far south as Augusta, Ga. During the closing days of the month freezing temperature and snow occurred at Flagstaff, Ariz.

Warnings were issued well in advance of storms that threatened shipping on the seacoasts and Great Lakes, and ample and timely advices regarding frosts and freezing temperatures were distributed in sections where vegetation was subject to damage by cold.

The display of storm warnings on the Great Lakes was resumed for the season April 16, 1906.

BOSTON FORECAST DISTRICT.

The principal storm occurred on the 9th and 10th, when heavy precipitation occurred over a great part of New England. In Maine the precipitation fell as snow, which exceeded 6 inches in many sections of the State. Along the coast the storm was attended by easterly gales that caused considerable damage to shipping and to telegraph and telephone lines. Storm warnings are displayed in connection with this storm and also on the 14th and 24th. No gales occurred for which warnings were not displayed.—*J. W. Smith, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

Fine seasonable weather prevailed. Several thunderstorm periods were attended by moderate rains and more or less severe local storms. There were three warm periods and a like number of cool periods with frost. Special frost warnings issued on the mornings of the 16th and 23d were verified.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

Warnings were issued to open ports on Lake Michigan in connection with storms that reached the upper Lake region on the 9th and 14th. On the morning of the 25th warnings were issued to Lake ports for a storm that occupied the middle Missouri Valley. This storm was attended by thundersqualls on Lakes Michigan and Superior.—*H. J. Cox, Professor and District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

No storm or cold-wave warnings were issued or required. Frost warnings were issued on the 13th for Oklahoma and on the 14th for Arkansas and were verified over portions of the area covered by the warnings. No frost occurred without warning.—*I. M. Cline, District Forecaster.*

DENVER FORECAST DISTRICT.

Unsettled weather predominated. Storms were not severe in the plains region, but in the mountain districts, especially in Colorado, heavy falls of snow were common. Light frost was noted on a number of dates, but owing to the backwardness of vegetation little or no damage resulted. No special warnings were issued or needed.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO AND PORTLAND FORECAST DISTRICTS.

Rain occurred in southern California on the 4th, 5th, and 6th, and in Nevada on the 11th, and rain was general in California and Nevada on the 10th, 22d, 27th, and 28th. In the North Pacific States and Idaho the month was warm and dry, the mean temperature at Portland, Oreg., being the highest on record for that station. Frost occurred frequently during the month and timely warnings were issued in connection therewith. Storm warnings were ordered well in advance of a storm that appeared off the Washington coast on the morning of the 8th.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

At the close of the month of March, 1906, the Ohio and Mississippi rivers and their principal tributaries were rising rapidly, and by the second day of April a moderate flood was in progress in the Ohio River below the Big Sandy, the crest passing Cairo on the 9th. The stages from Cincinnati to Cairo were only slightly above the flood lines, except at Evansville and Mount Vernon, Ind., where the water reached a height of a little over 41 feet on the 6th and 7th, about six feet above the flood stage. Along the Wabash and White rivers the flood was quite severe, with a stage at Mount Carmel, Ill., on the Wabash River, of 23.6 feet, 8.6 feet above the flood stage. A large area of bottom lands was overflowed, and in a few lowland sections the people were compelled to temporarily abandon their homes. The damage done was comparatively little, as the floods occurred sufficiently early to allow the bottoms to dry out fairly well before the full inauguration of the season of spring plowing. There was some damage done to growing wheat along the Wabash River, but its exact extent has not been ascertained.

The preliminary warnings for these floods were issued on March 28, and specific ones regularly thereafter until the waters began to recede.

The lower Mississippi flood also set in early, and the dates of reaching the flood stages at the various stations were as follows:

Station.	Flood stage.	Date.	Maximum stage.	Date.
New Madrid, Mo.	34	April 2	37.0	April 9-12
Luxora, Ark.	33	....	31.3	April 14-15
Memphis, Tenn.	33	April 6	37.1	April 16
Helena, Ark.	42	April 8	47.0	April 18-19
Arkansas City, Ark.	42	April 5	50.0	April 22
Greenville, Miss.	42	April 14	44.9	April 23-24
Vicksburg, Miss.	45	April 17	47.2	April 26
Natchez, Miss.	46	April 24	46.7	April 29-30
Baton Rouge, La.	35	May 1	....	....
New Orleans, La.	16	April 20	....	....

At the end of the month the river was falling from Natchez northward, but was still rising slowly below.

The issue of flood warnings began over the Memphis district on March 31, and they were gradually extended southward at the proper times. The warnings were verified to almost absolute exactness, and, so far as has been ascertained, no serious damage was caused, nor was there any irreparable delay in planting. Many people were, of course, subjected to considerable expense and inconvenience, but such experiences are in a measure expected almost annually. The following report on the flood in the Memphis district was prepared by Mr. S. C. Emery, the official in charge of the local office of the Weather Bureau at Memphis, Tenn. The remarks of Mr. Emery as to the effects of recent levee construction, and his deductions from the changed gage relations between Cairo and Helena, are especially interesting and instructive.

* * * * * * *

The first important rise of the season had its beginning about March 1, and was caused by a series of heavy rains over the Missouri watershed, supplemented by a protracted period of local rains. After reaching nearly a bank-full stage about the middle of March, there occurred a slight decline, which was suddenly checked on March 24 by a sharp rise. This was caused by a Texas rainstorm that passed over the central valleys about that time, causing flood stages in many of the upper tributaries. These flood waters came mainly from the upper Mississippi, Ohio, and Cumberland rivers, and coming, as they did, into the lower stream with its already well-filled banks, at once gave promise of very high water throughout this district. Accordingly on March 31 warning messages and bulletins were extensively distributed over the threatened area; the inhabitants of the lowlands of Tennessee and Arkansas were notified that flood stages would soon prevail throughout the district, and that the river would be out of its banks in about seven days. Two days later a second warning bulletin was issued, in which the people were advised to prepare for stages as high as 38 feet at New Madrid, 37 feet at Memphis, and 47 feet at Helena. Considering the already swollen condition of the river, the rise was remarkably rapid, the daily increase ranging from two feet to about one-half foot from the beginning of the rise, on March 24, until the arrival of the flood crest, on April 14. On the latter date the river became practically stationary at Memphis, although the actual maximum occurred at noon of the 16th, when the gage marked 37.1 feet. The highest stage reached at New Madrid was 37 feet on April 9, and that at Helena, 47 feet on the 18th.

The river was above the danger line as follows: New Madrid from April 2 to 19, 18 days; at Memphis from April 6 to 24, 19 days; and at Helena from April 7 to 28, 21 days.

The region overflowed embraced all the bottom lands along the left bank of the Mississippi River from below Hickman, Ky., to a short distance above Memphis, most of the islands, and all of the Arkansas lands lying outside the protecting levee. The overflow caused no serious damage to property, or, as far as known, irreparable delay in planting. It necessarily caused very great inconvenience and considerable expense to the large number of people who were forced to abandon their homes and move live stock and other property to places of safety, but as, in some sections at least, these conditions have become somewhat of an annual occurrence, and as the people are in a measure prepared for such emergencies, the hardships in that connection were not excessive. All levee work was suspended, and a few of the camps of workmen were moved to higher ground.

As often as the mail facilities would permit, weather maps and river bulletins were sent to every town or settlement having a post office, and distributed along the river by passing boats. In this way nearly every one in the district was kept very well informed regarding the situation and also as to the prospects for the immediate future. As a result of the widespread distribution of river information there was very little excitement, and planters as a rule were able to control their negro help. Residents of Memphis having property interests in the overflowed district consulted with this office daily, and upon the advice given set about moving or otherwise protecting their property, or refrained from doing so as the exigencies of the case seemed to warrant.

The effect of the new extensions to the levee system has been the raising of the flood level in certain sections, notably at New Madrid and Helena. At the latter place, owing to the closing of an 18-mile gap in the levee south from Walnut Bend, which prevents the water from flowing out over the southeast portion of Lee County as it has done in previous years, the flood level has been raised about one and one-half feet; that is, with the same amount of water that obtained in 1903 and 1904 the gage at Helena may be expected to show about one and one-half feet more than was registered during the high water of those years.

The effect of the new levee along the south end of the basin is shown to some extent at Memphis and as far south as Mhoon's Landing, Miss. The additional restraint caused by the modified levee conditions has resulted in a slight engorgement, making the outflow somewhat less rapid, and retarding the arrival and passing of the flood crest at this place. In former years the crest of any rise was usually from two to three days in passing from Cairo to Memphis, while during the present high water the river at Memphis rose steadily for five days after a fall had set in at Cairo, and even on the seventh day a rise of two-tenths of a foot occurred, though the latter may possibly have been caused by the return waters from the Reelfoot bottoms, as was the case in 1903.

The usual flooding of North Memphis did not occur this year, on account of the recent construction of a high levee along the banks of Bayou Gayoso, which prevents the backwater in Wolf River from entering that portion of the city.

A change has also occurred in the gage relation between Cairo and New Madrid, Mo., the high-water level at the latter place having been raised nearly one foot since 1903. This is supposed to be due to the 4-mile extension recently made in the Reelfoot levee, which runs south from Hickman, Ky., to Tiptonville, Tenn., and fronts the Reelfoot bottoms. The object of this levee was to prevent the overflow waters from spreading through the lowlands in the northern portion of Lake County, Tenn., to Reelfoot Lake, from which place it passes through the marshes and small tributaries, entering the main stream several miles below New Madrid. About seven miles of the distance required to inclose the Reelfoot district is still open to the free passage of the overflow water, but in its incomplete state it has caused the increase at New Madrid noted above. When this levee has been completed, and the water is confined within narrower limits, we may expect the New Madrid gage to show a stage nearer approaching the Cairo reading than has heretofore obtained, as the waters that have formerly passed over and through the low country on the east side of the Mississippi will be thrown back to the Missouri shore.

The recent high water is of special interest at this time, as it is the first occurrence of such conditions since the completion of the St. Francis system of levees, which now extend from Point Pleasant, Mo., to the high ground near the mouth of the St. Francis River, a short distance above Helena, Ark., a total length of 207 miles. It was built jointly by the United States Government and the tax payers of Arkansas, at a cost to date of nearly $4,000,000, and the present flood afforded the first successful test that has been given the levees since the completion of the entire system. It was in every way quite satisfactory. The water against the levees ranged in depth from 10 to 15 feet, and, while at no time were they considered in danger, they were given very close attention by the U. S. Engineers and Mississippi River Commission officials, a regular patrol being kept up over the entire line.

As an indication of the increasing confidence in the stability of the levee, even in its present state, it can be stated that the high water caused no interruption whatever to farm work or other operations throughout eastern Arkansas, except over those portions lying outside the levee. One could stand upon these great embankments, and see upon one side farmers busy at work planting their crops or engaged in other pursuits and on the other a wide expanse of water with no habitable spot visible as far as the eye could reach.

A very interesting fact in connection with the recent rise is that the highest stage at Memphis was only two-tenths of a foot below the maximum registered by the same gage during the great flood of 1897, when the St. Francis basin was completely inundated and a large number of its inhabitants were forced to leave their homes, to be cared for in refugee camps wherever such could be established.

Notwithstanding this similarity in the height of the wave crests at Memphis during the high water of 1897 and 1906, the records show that the maximum stage at Cairo in 1897 was nearly five feet higher than in 1906. This marked increase at Memphis is of course the result of confining the water to narrower limits, the full effect of which is now shown for the first time since the beginning of levee construction in this district in 1895.

It is now a well established fact that a stage at Cairo equal to that of 1883 (52.2 feet) would raise the water on the Memphis gage to 43 and possibly to 44 feet.

Nothing of interest occurred along the upper Mississippi, except in the vicinity of Hannibal, Mo., where the river was above the flood stage of 13 feet throughout the month, reaching a maximum stage of 15.2 on the 25th. The public was kept well informed of the steady rise, and but little damage resulted. Some unprotected bottom lands on both sides of the river were overflowed, and there was sufficient seepage through the Sny levee to somewhat delay farming operations on the lands behind.

The rivers of Alabama and eastern Mississippi which were generally above the flood stages at the beginning of the month, fell steadily after that time, reaching the normal low-water levels during the last days.

The annual rise of the Columbia River began on the 3d, an unusually early date. The extent of the rise and the possibility of severe floods depends, of course, upon the subsequent weather conditions, but the opinion appears to prevail that the melting snows from the mountains will supply all streams affected with at least an abundance of water for irrigation purposes. The following table shows the maximum stages at Portland, Oreg., resulting from the spring rises of the last thirty years, except those of 1877 and 1878:

Year.	Date.	Stage.
1876	June 24	28.2
1879	June 9	20.5
1880	July 1	27.3
1881	June 16	19.7
1882	June 14	26.2
1883	June 14	17.8
1884	June 14	22.2
1885	June 23	14.5
1886	June 9	20.0
1887	June 21	25.7
1888	June 18	18.2
1889	May 21	10.0
1890	May 20	21.1
1891	June 7	14.1
1892	June 24	19.3
1893	June 15	22.0
1894	June 7	33.0
1895	May 30	16.3
1896	June 23	23.8
1897	May 24	27.7
1898	June 19	20.7
1899	June 23	24.2
1900	May 20	17.8
1901	June 3	20.8
1902	June 4	20.8
1903	June 19	24.0
1904	June 27	20.8
1905	June 15	13.6

The highest and lowest water, mean stage, and monthly range at 309 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

NOTE.—The term, "danger line", will no longer be used in designating the overflow stages of rivers. As a substitute the words "flood stage", will be used, the term meaning the lowest stage of water at which overflow will begin.

CLIMATOLOGICAL SUMMARY.

By Mr. James Berry, Chief of the Climatological Division.

TEMPERATURE AND PRECIPITATION BY SECTIONS, APRIL, 1906.

In the following table are given, for the various sections of the Climatological Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	65.0	+ 2.4	Highland Home	96	30	Tuscaloosa	28	1	1.03	−3.00	Bridgeport	2.43	Spring Hill	0.00
Arizona	59.2	− 2.3	Maricopa Parker	103 103	22 21	Grand Canyon	12	12	0.63	+0.18	Williams	2.16	Bowie	0.00
Arkansas	63.7	+ 1.9	Newport (No. 1)	97	11	4 stations	27	1	2.55	−1.85	Centerpoint	4.82	Arkansas City	0.70
California	56.3	0.0	Imperial	106	21	Tamarack	8	8	1.68	−0.43	Blue Canon	7.42	Heber	0.12
Colorado	44.5	+ 0.7	Las Animas Holly	90 90	3 21, 23	Longs Peak (near) Clear View	2 2	4 13	3.08	+1.22	Cardinal	6.72	San Luis	0.05
Florida	69.9	+ 0.4	New Smyrna Orange City	98 98	26 28	De Funiak Springs	31	2	1.20	−1.17	Hypoluxo	4.19	2 stations	0.00
Georgia	64.9	+ 2.5	3 stations	98	30	Clayton	25	2	1.15	−2.08	Elberton	3.18	Waycross	0.01
Hawaii	70.7†	....	Waialua, (Opaeula) Oahu.	92	3, 26	Humuula, Hawaii	35	20	5.67‡	....	Honomanu Valley, Maui.	26.96	Ewa Plantation, Oahu.	0.02
Idaho	47.1	+ 1.6	Orofino	96	21	Lake	4	14	1.09	−0.23	Grangeville	2.57	Lewiston	0.07
Illinois	55.5	+ 3.2	Equality	98	29	Antioch	20	1	2.06	−1.17	Pana	3.94	Benton	0.70
Indiana	54.6	− 2.4	Mount Vernon	91	28	Crawfordsville	19	1, 2	2.13	−0.92	Shelbyville	3.66	Bedford	0.23
Iowa	52.5	+ 3.1	Ida Grove Onowa	94 94	24 24	Clinton, Webster Odebolt	22 22	1 6	2.42	−0.46	Glenwood	5.55	Independence	0.53
Kansas	58.6	+ 3.2	Colby Farnsworth	94 94	24 23	Wallace	22	14	2.97	+0.13	Winfield	6.70	Englewood	1.47
Kentucky	59.5	+ 2.7	Bowling Green Highbridge	94 94	12 29	Farmers	23	2	1.40	−2.29	Middlesboro	2.23	Highbridge	0.53
Louisiana	68.0	+ 0.8	Alexandria Reserve	93 93	27 30	Calhoun	32	1	2.91	−1.68	Georgetown	7.08	Schriever	0.83
Maryland and Delaware	54.1	+ 2.2	College Park, Md.	96	30	Deer Park, Md.	10	1	3.14	−0.12	McDonogh, Md.	5.37	Westernport, Md.	0.38
Michigan	45.9	+ 2.8	Allegan	87	27	Humboldt	4	6	1.76	−0.35	Cassapolis	4.00	Cheboygan	0.20
Minnesota	47.9	+ 4.2	Lynd (Rouse)	88	24	Halstad	14	4	1.72	−0.54	Farmington	3.38	Worthington	0.22
Mississippi	65.7	+ 1.3	Leakesville	94	30	Ripley	29	1	1.80	−2.43	Magnolia	4.65	Macon	0.60
Missouri	59.5	+ 3.6	Versailles	93	24	Willowsprings Zeitonia	22 22	1 1	2.24	−1.39	Maryville	4.31	Cape Girardeau	0.91
Montana	46.8	+ 3.9	Tokna	93	23	Lamedeer	− 5	3	1.09	−0.13	Mullets Ranch	3.69	Fort Logan	0.00
Nebraska	52.6	+ 3.2	Halsey Santee	96 96	23 24	Agate	10	15	4.35	+1.49	Central City	10.13	Cody	1.20
Nevada	47.6	+ 0.9	Martin's Ranch	90	20	Palisade	9	4	1.31	+0.50	Palmetto	4.33	2 stations	T.
New England*	43.9	+ 0.1	Westboro, Mass	77	21	Van Buren, Me.	− 7	3	2.85	−0.06	Norwalk, Conn	6.32	St. Johnsbury, Vt.	0.54
New Jersey	51.2	+ 2.1	Bridgeton	87	27, 30	Layton	17	2, 3	3.59	+0.26	Englewood	6.42	Cape May	1.17
New Mexico	52.6	0.0	Carlsbad San Marcial	90 90	11 25	Fort Wingate	10	8	1.55	+0.89	Fort Wingate	4.65	Strauss	T.
New York	44.7	+ 0.8	3 stations	80	19, 29	North Lake	5	2	2.44	−0.24	New York City	5.78	Chazy	0.20
North Carolina	60.3	+ 3.0	3 stations	94	30	Pink Beds	18	3	1.63	−2.08	Pink Beds	4.49	Wash Woods	0.44
North Dakota	46.7	+ 6.3	Napoleon	88	24	Sentinel Butte	8	4	1.50	−0.27	Oriska	3.51	Denhoff	0.42
Ohio	52.1	+ 2.3	Ironton	91	13	Atwater Bellefoutaine	18 18	1 1	1.89	−0.96	Clarington	6.20	Coalton	0.88
Oklahoma and Indian Territories.	62.5	+ 1.5	Arapaho, Okla.	95	24	Kenton, Okla.	25	14	4.17	+1.16	Cache, Okla	7.15	Gage, Okla.	1.97
Oregon	51.3	+ 3.5	Marble Creek.	102	21	3 stations	12	1, 12, 16	1.59	−1.48	Gold Beach	5.71	Umatilla	0.02
Pennsylvania	50.0	+ 1.7	Montrose	89	21	Pocono Lake	12	3	3.13	+0.02	Gordon	6.96	Baldwin	0.75
Porto Rico	75.3	....	Manati	95	23	Adjuntas	49	8, 18	3.38	....	Bayamon	9.24	Guayama	0.03
South Carolina	65.1	+ 2.5	3 stations	93	29, 30	Seivern	28	24	1.39	−2.16	Calhoun Falls	2.84	Darlington	0.36
South Dakota	50.1	+ 3.8	Chamberlain	94	24	Pine Ridge	15	4	2.48	+0.03	Academy	6.04	Fort Meade	0.25
Tennessee	60.8	+ 2.6	Carthage Pope	92 92	21 12	Hohenwald	22	1	2.51	−1.88	Franklin (near)	6.35	Savannah	0.53
Texas	66.3	− 0.3	Fort Ringgold	99	13, 14	3 stations	31	3, 4	2.67	−0.41	Quanah	5.88	Kent	0.01
Utah	48.0	− 0.6	St. George	94	21, 26	Ranch	5	2	2.10	+0.92	Payson	4.57	Lucin	0.20
Virginia	56.2	+ 2.4	Arvonia	94	30	Burkes Garden	20	3	2.41	−0.77	Skyland	4.63	Buchanan	1.19
Washington	52.6	+ 3.7	Zindel	95	21	Bonita	8	1	0.69	−1.91	Aberdeen	2.94	5 stations	0.00
West Virginia	54.1	+ 2.0	Cairo Sutton	92 92	29 13	Bayard	15	1	3.16	−0.46	Terra Alta	6.59	Elkhorn	0.57
Wisconsin	47.6	+ 2.3	Koepenick	86	27	Minocqua	9	1	1.68	−0.85	Grantsburg	3.56	La Crosse	0.73
Wyoming	40.6	+ 1.6	Moorcroft	86	23	Grand Canyon	−10	4	1.50	−0.11	Centennial	3.62	2 stations	T.

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. † 45 stations, with an average elevation of 791 feet. ‡ 132 stations.

THE WEATHER OF THE MONTH.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VI, and the average values and departures from normal are shown in Tables I and V.

The average pressure for April, 1906, over the United States and Canada departed considerably from the normal as to the general position of the highs and lows common to the month. The high pressure, normal over the region from Florida northward to Hudson Bay, was materially augmented during April over its southern extremity and diminished rapidly northward; the north Pacific high extended eastward well beyond its normal limits and the low over the Southwest was appreciably higher than the average.

Over the northern portion of the States of Minnesota and North Dakota, and extending into the Canadian Northwest Territories, the pressure averaged much lower than the normal.

The resulting distribution was a marked ridge of high pressure extending from the Gulf States northwestward to the States of Washington and Oregon, and diminishing by gentle gradients north and south.

TEMPERATURE.

Under the influence of the distribution of pressure, noted above, the surface drift of the atmosphere was largely northward from the ridge of highest pressure, and average temperatures far above the normal for the month were recorded in all districts brought under the influence of the warm southerly winds which extended as far north as the field of observation.

Over the region from the Great Lakes westward to the Rocky Mountains and northward, the average temperatures for the month were, with one or two exceptions, as high as any previously recorded in April.

South of the ridge of highest pressure, under the influence of generally northerly surface winds, the temperature averages were below the normal.

The lowest temperatures recorded during the month occurred in northern Maine, where readings below zero were reported.

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	9	43.5	+ 0.5	+ 5.6	+ 1.4
Middle Atlantic	13	53.5	+ 2.7	+ 4.5	+ 1.1
South Atlantic	10	63.9	+ 2.0	0.0	0.0
Florida Peninsula *	8	71.0	+ 0.5	— 1.7	— 0.4
East Gulf	8	66.5	+ 0.7	— 6.7	— 1.7
West Gulf	7	67.4	+ 0.3	— 3.7	— 0.9
Ohio Valley and Tennessee	12	57.6	+ 2.2	— 1.2	— 0.3
Lower Lake	8	46.9	+ 2.2	+ 5.9	+ 1.5
Upper Lake	10	44.9	+ 4.2	+ 9.8	+ 2.4
North Dakota *	8	47.7	+ 6.4	+16.6	+ 4.2
Upper Mississippi Valley	13	54.0	+ 3.4	+ 4.0	+ 1.0
Missouri Valley	11	54.8	+ 3.9	+ 9.0	+ 2.2
Northern Slope	7	48.1	+ 3.5	+11.3	+ 2.8
Middle Slope	6	56.0	+ 1.8	+ 4.3	+ 1.1
Southern Slope *	6	60.1	— 0.5	— 3.1	— 0.8
Southern Plateau *	13	54.7	— 0.3	+ 6.2	+ 1.6
Middle Plateau *	8	47.3	0.0	+ 4.3	+ 1.1
Northern Plateau *	12	50.4	+ 3.7	+ 8.9	+ 2.2
North Pacific	7	51.3	+ 2.7	+ 9.0	+ 2.2
Middle Pacific	5	56.0	+ 1.5	+ 7.8	+ 2.0
South Pacific	4	50.0	— 0.6	+ 6.0	+ 1.5

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Prof. R. F. Stupart says:

The mean temperature of April was higher than the average over the whole Dominion, excepting a portion of the Maritime Provinces, where there was a negative departure of from 1° to 2°. The widest positive departure from average, amounting to between 8° and 10°, occurred in Manitoba and Saskatchewan, whence westward it diminished to 3° near the Pacific coast, and eastward to between 1° and 3° in Ontario and western Quebec.

PRECIPITATION.

The persistence of high barometric pressure over the South Atlantic and Gulf States and over the States of Oregon and Washington, and a corresponding absence of low pressure areas, resulted in a largely diminished amount of precipitation over those regions.

Over portions of Georgia, Alabama, Mississippi, and Tennessee the month was the driest April on record, and similar conditions prevailed over the greater parts of Washington and Oregon. As a whole the month was one of deficient rainfall, nearly all sections showing amounts below the normal, except western Texas and the southern Rocky Mountain region, where amounts considerably above the normal were recorded.

The snowfall for the month was confined largely to the mountain regions of the west and the northern tier of States. The amounts were generally light, except over New England, where depths as great as 20 inches were recorded, and over the central Rocky Mountain region, where heavy falls occurred, thereby augmenting the already abundant visible supply of water available for irrigation.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	9	2.60	81	—0.6	—1.2
Middle Atlantic	13	2.49	76	—0.8	—2.2
South Atlantic	10	1.26	39	—2.0	—3.5
Florida Peninsula *	8	1.14	49	—1.2	+0.3
East Gulf	8	1.27	28	—3.3	—4.0
West Gulf	7	2.12	55	—1.7	—5.2
Ohio Valley and Tennessee	12	2.11	54	—1.8	—4.9
Lower Lake	8	1.81	78	—0.5	—3.2
Upper Lake	10	1.61	69	—0.7	—0.4
North Dakota *	8	1.31	77	—0.4	—1.0
Upper Mississippi Valley	13	1.83	62	—1.1	—0.1
Missouri Valley	11	2.81	97	—0.1	+0.6
Northern Slope	7	1.64	100	0.0	+0.3
Middle Slope	6	2.86	132	+0.7	+0.3
Southern Slope *	6	3.59	190	+1.7	+1.0
Southern Plateau *	13	1.58	273	+1.0	+2.0
Middle Plateau *	8	1.94	170	+0.8	+2.3
Northern Plateau *	12	0.57	45	—0.7	—0.9
North Pacific	7	1.47	35	—2.7	—7.6
Middle Pacific	5	1.36	55	—1.1	+3.2
South Pacific	4	0.82	58	—0.6	+4.6

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Professor Stupart says:

The precipitation was in excess of the normal over the Maritime Provinces, while in all other parts of the Dominion it was deficient. In British Columbia, the Northwest Provinces, excepting a few localities in Manitoba, and over most of northern Ontario, the total fall was very scant, and in southern Ontario and in Quebec it was considerably short of the average for April. Halifax, with 8.4 inches, and Charlottetown, with 6.1 inches, were the two stations with the largest amounts, including several inches of snow. In many districts of the upper Ottawa Valley the total fall was less than half an inch, and this was also the case very generally in the Northwest Provinces.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	70	— 3	Missouri Valley	65	0
Middle Atlantic	62	— 5	Northern Slope	60	+ 2
South Atlantic	64	— 8	Middle Slope	62	+ 5
Florida Peninsula	74	0	Southern Slope	61	+ 6
East Gulf	68	— 2	Southern Plateau	46	+16
West Gulf	74	+ 2	Middle Plateau	56	+11
Ohio Valley and Tennessee	64	— 1	Northern Plateau	53	— 4
Lower Lake	68	— 2	North Pacific	74	— 4
Upper Lake	71	— 2	Middle Pacific	70	— 2
North Dakota	69	+ 1	South Pacific	71	+ 3
Upper Mississippi Valley	67	— 1			

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Block Island, R. I.	10	50	e.	New York, N. Y.	6	52	nw.
Cape Henry, Va.	23	50	nw.	Do	24	54	w.
Do	25	56	w.	Do	25	52	w.
Cleveland, Ohio	22	52	nw.	North Head, Wash.	8	60	se.
Columbus, Ohio	9	60	w.	North Platte, Nebr.	13	59	n.
Denver, Colo.	12	52	n.	Oklahoma, Okla.	1	50	s.
El Paso, Tex.	24	51	w.	Do	24	54	sw.
Indianapolis, Ind.	9	56	sw.	Point Reyes Light, Cal.	1	68	nw.
Modena, Utah	23	58	sw.	Do	10	74	nw.
Mount Tamalpais, Cal.	2	51	nw.	Do	11	62	nw.
Do	3	69	ne.	Do	23	56	nw.
Do	4	52	ne.	Do	25	53	nw.
Do	6	52	sw.	Do	27	71	nw.
Do	10	50	nw.	Do	28	71	nw.
Do	16	55	nw.	Pueblo, Colo.	7	51	nw.
Do	17	52	nw.	Do	24	55	w.
Do	25	57	nw.	Southeast Farallon, Cal.	1	51	nw.
Do	27	70	nw.	Do	10	51	nw.
Do	28	60	nw.	Do	27	52	nw.
Mount Weather, Va.	6	60	nw.	Do	28	54	nw.
Do	23	60	nw.	Tatoosh Island, Wash.	8	58	s.
Do	24	52	nw.	Valentine, Nebr.	13	50	nw.
Do	25	52	nw.	Do	24	68	nw.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.3	0.0	Missouri Valley	5.1	−0.3
Middle Atlantic	4.5	−0.7	Northern Slope	4.5	−0.9
South Atlantic	3.6	−0.8	Middle Slope	4.8	+0.4
Florida Peninsula	3.6	−0.3	Southern Slope	5.0	+0.8
East Gulf	4.4	−0.1	Southern Plateau	3.4	+1.1
West Gulf	5.8	+0.6	Middle Plateau	5.2	+0.7
Ohio Valley and Tennessee	4.4	−0.9	Northern Plateau	4.2	−2.1
Lower Lake	4.9	−0.6	North Pacific	6.1	−0.4
Upper Lake	5.1	−0.6	Middle Pacific	4.1	−0.5
North Dakota	5.2	−0.3	South Pacific	3.8	−0.1
Upper Mississippi Valley	4.8	−0.7			

DESCRIPTION OF TABLES AND CHARTS.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

For description of tables and charts see page 38 of REVIEW for January, 1906.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, April, 1906.*

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
New England.							**43.5**	**+ 0.5**										**70**	**2.60**	**— 0.6**										**5.3**	
Eastport	76	69	85	29.82	29.91	— .02	38.1	— 0.5	57	17	44	23	7	32	24	35	31	79	3.51	+ 0.5	11	8,473	nw.	42	e.	10	6	11	13	6.2	14.8
Portland, Me.	103	81	117	29.83	29.96	.00	41.4	— 1.6	60	17	48	23	1	34	25	37	32	73	3.53	+ 0.5	8	7,119	nw.	36	s.	14	10	8	12	5.5	20.5
Concord	288	70	79	29.63	29.95	— .04	43.5	— 0.8	71	21	54	21	3	33	39	....	....	....	1.44	— 1.4	8	4,584	nw.	28	nw.	24	16	8	6	3.7	6.0
Northfield	876	16	70	29.02	29.98	— .01	38.6	— 0.7	68	30	49	11	3	28	40	35	30	72	1.05	— 1.0	6	6,154	nw.	44	nw.	24	8	6	16	6.4	7.6
Boston	125	115	188	29.83	29.97	.00	47.2	+ 2.1	70	29	55	28	1	40	31	41	34	63	2.15	— 1.3	8	7,528	nw.	41	se.	10	10	9	11	5.2	T.
Nantucket	12	14	90	29.95	29.96	— .01	44.2	+ 1.1	60	22	50	31	4	38	19	40	36	77	2.17	— 1.4	9	10,484	sw.	49	se.	10	14	11	5	4.6	T.
Block Island	26	11	46	29.94	29.96	— .02	45.4	+ 2.0	63	21	51	31	3	40	20	41	37	77	2.03	— 1.4	7	11,870	sw.	50	e.	10	8	14	8	5.2	
Narragansett	......	9	....	......	......	......	44.8	+ 0.6	66	21	53	24	*	36	28	....	....	....	3.01	— 0.6	10	......	se.	....	......	..	14	10	6	....	
Providence	160	57	67	29.79	29.97	— .01	47.4	......	75	21	57	26	2	38	33	40	32	60	2.07	......	7	5,569	nw.	34	e.	10	9	11	10	5.3	0.6
Hartford	159	122	132	29.80	29.98	— .01	48.2	......	75	21	58	26	3	38	33	42	35	65	3.58	......	8	5,365	nw.	29	nw.	24	7	12	11	6.3	1.5
New Haven	106	116	155	29.86	29.98	— .01	48.5	+ 2.4	73	21	58	28	3	39	32	42	35	63	4.48	+ 1.0	7	6,840	nw.	40	e.	9	12	11	7	4.5	T.
Mid. Atlantic States.							**53.5**	**+ 2.7**										**62**	**2.49**	**— 0.8**										**4.5**	
Albany	97	102	115	29.88	29.99	— .01	47.4	+ 1.4	75	19	57	25	3	38	36	41	34	63	2.20	— 0.3	9	5,555	nw.	31	s.	14	8	14	8	5.6	6.7
Binghamton	875	79	90	29.07	30.01	— .01	45.2	— 0.3	73	19	55	23	3	36	40	....	....	....	2.32	+ 0.2	13	4,924	nw.	26	se.	9	10	4	16	6.0	T.
New York	314	108	350	29.64	29.98	— .02	51.7	+ 3.6	74	30	60	31	1	43	29	45	39	67	5.78	+ 2.4	8	9,712	nw.	54	w.	24	12	11	7	4.4	T.
Harrisburg	374	94	104	29.62	30.02	.00	53.4	+ 3.3	79	30	63	31	1	44	34	45	36	56	3.35	— 0.1	8	5,967	nw.	27	nw.	6	10	9	11	5.1	
Philadelphia	117	116	184	29.88	30.01	.00	55.5	+ 5.0	84	30	65	32	1	46	30	47	39	58	3.17	+ 0.2	7	6,640	nw.	38	nw.	23	10	13	7	4.8	
Scranton	805	111	119	29.13	30.00	— .01	48.0	......	76	20	58	27	3	38	32	42	35	65	4.25	......	12	5,589	nw.	29	nw.	25	12	10	8	4.7	6.2
Atlantic City	52	37	48	29.95	30.02	+ .02	50.4	+ 3.6	78	21	58	28	1	42	24	45	39	69	1.83	— 1.5	7	6,339	nw.	29	se.	9	8	12	10	5.4	
Cape May	17	48	52	30.02	30.04	+ .05	51.5	+ 3.3	77	27	58	31	1	44	28	46	....	....	1.17	— 2.0	10	6,844	s.	38	nw.	23	11	16	3	4.4	T.
Baltimore	123	69	117	29.88	30.01	.00	56.1	+ 3.0	87	30	66	31	1	46	33	47	37	52	3.31	— 0.1	9	5,972	nw.	33	nw.	23	12	5	13	5.4	
Washington	112	59	76	29.90	30.02	.00	55.5	+ 2.5	87	30	66	27	3	44	36	47	38	57	3.03	— 0.3	9	5,283	nw.	37	nw.	6	14	11	5	3.9	
Cape Henry	18	11	58	30.01	30.03	+ .03	56.8	+ 2.2	87	30	65	35	1	48	36	....	....	....	1.29	— 3.2	9	10,081	sw.	56	w.	25	15	11	4	3.7	
Lynchburg	681	83	88	29.29	30.04	+ .02	58.6	+ 2.7	89	30	72	31	1	45	47	50	43	62	2.47	— 0.9	6	3,447	nw.	29	nw.	23	16	11	3	4.1	
Mount Weather	1,725	10	57	28.20	30.03	+ .01	51.2	......	82	30	61	21	1	42	28	43	34	58*	3.61	......	8	14,424	nw.	60	nw.	6	15	12	3	3.7	T.
Norfolk	91	102	111	29.95	30.05	+ .04	58.7	+ 2.5	87	30	68	35	1	49	34	50	44	62	1.54	— 2.5	10	7,264	sw.	33	nw.	23	15	9	6	3.7	
Richmond	144	145	153	29.90	30.05	+ .03	59.1	......	89	30	71	30	1	47	38	....	....	....	2.16	— 1.5	9	6,590	s.	38	se.	14	16	11	3	3.3	
Wytheville	2,293	40	47	27.69	30.06	+ .03	54.2	+ 2.6	81	30	67	30	3	42	38	48	44	72	1.28	— 1.8	9	5,069	w.	27	w.	5	19	6	5	3.3	
S. Atlantic States.							**63.9**	**+ 2.0**										**64**	**1.26**	**— 2.0**										**3.6**	
Asheville	2,255	53	75	27.74	30.09	+ .06	56.5	+ 2.0	84	30	69	29	2	44	39	47	40	61	2.35	— 0.7	7	5,700	nw.	36	nw.	6	16	12	2	3.5	
Charlotte	773	68	76	29.24	30.08	+ .05	63.2	+ 3.5	88	30	74	37	24	52	33	52	44	58	0.93	— 2.6	7	5,674	sw.	34	sw.	14	13	10	7	4.2	
Hatteras	11	12	47	30.06	30.07	+ .06	69.1	+ 1.9	77	27	66	37	2	52	22	....	....	....	1.78	— 2.4	7	11,356	sw.	43	nw.	22	21	8	1	....	
Raleigh	376	71	79	29.65	30.05	+ .02	62.8	+ 4.0	90	30	75	34	3	51	40	51	42	53	0.73	— 2.6	6	5,247	sw.	32	nw.	22	16	11	3	3.3	
Wilmington	78	81	91	29.97	30.05	+ .02	63.4	+ 1.9	88	27	73	37	2	54	30	54	49	67	0.49	— 2.5	3	6,424	sw.	31	w.	6	14	15	1	3.2	
Charleston	48	14	92	30.04	30.09	+ .06	66.2	+ 1.6	86	28	75	44	2	58	27	58	54	72	1.17	— 2.4	3	7,827	sw.	34	w.	6	20	9	1	2.8	
Columbia, S. C.	351	41	57	29.69	30.07	+ .04	65.2	+ 1.6	88	30	77	38	3	53	37	55	47	60	2.74	0.0	7	5,479	sw.	36	sw.	14	12	14	4	4.3	
Augusta	180	89	97	29.89	30.08	+ .05	66.0	+ 1.8	89	12	78	38	3	54	38	55	47	58	0.97	— 2.4	6	4,733	nw.	36	s.	13	14	7	9	4.2	
Savannah	65	81	89	30.03	30.10	+ .07	67.6	+ 1.5	91	29	78	42	1	58	30	58	52	69	1.17	— 2.3	3	5,759	sw.	30	ne.	29	17	10	3	3.5	
Jacksonville	43	101	129	30.04	30.09	+ .05	68.6	— 0.3	89	29	78	42	1	60	27	61	58	75	0.30	— 2.6	4	6,367	sw.	36	se.	29	14	12	4	3.8	
Florida Peninsula.							**72.7**	**— 0.3**										**74**	**1.54**	**— 0.6**										**3.6**	
Jupiter	28	10	48	30.05	30.08	+ .04	72.4	+ 0.4	83	29	78	50	1	67	19	67	64	77	2.57	— 0.2	7	8,401	se.	30	se.	9	4	24	2	4.9	
Key West	22	10	53	30.03	30.05	+ .03	75.0	— 1.1	84	28	79	64	5	71	12	68	65	73	0.54	— 0.7	3	7,496	e.	25	ne.	3	19	8	3	3.3	
Sand Key	25	40	71	30.02	30.04	+ .02	74.9	......	85	28	77	66	2	72	13	....	....	....	T.	......	0	11,320	e.	40	ne.	3	14	16	0	3.6	
Tampa	35	79	96	30.05	30.08	+ .02	70.8	— 0.3	89	29	80	50	1	61	24	63	59	72	1.50	— 0.8	4	5,455	ne.	28	ne.	12	21	7	2	2.8	
East Gulf States.							**66.5**	**+ 0.7**										**68**	**1.27**	**— 3.3**										**4.4**	
Atlanta	1,174	190	216	28.85	30.08	+ .05	63.8	+ 2.2	88	30	74	34	1	54	29	53	44	52	0.81	— 2.9	6	9,186	nw.	45	nw.	6	16	9	5	3.4	
Macon	370	55	66	29.71	30.11	+ .08	65.8	......	92	30	79	37	2	53	38	....	....	....	0.95	......	3	3,139	sw.	22	sw.	14	18	8	4	3.4	
Thomasville	273	8	57	29.82	30.11	+ .08	67.3	......	95	30	81	35	2	53	37	....	....	....	0.18	— 2.8	1	3,882	s.	24	s.	14	15	12	3	3.6	
Pensacola	56	79	96	30.05	30.11	+ .09	66.6	— 1.1	81	29	73	44	2	60	22	....	....	....	0.64	— 2.8	1	6,611	s.	24	s.	8	15	7	8	4.3	
Anniston	741	8	58	29.32	30.12	+ .09	64.0	......	90	12	78	33	2	50	39	....	....	....	1.61	— 2.8	4	3,766	se.	29	s.	13	13	6	11	4.9	
Birmingham	700	136	144	29.33	30.09	+ .07	66.3	+ 2.1	87	12	77	38	1	56	29	....	....	....	1.31	— 4.9	5	5,579	sw.	27	se.	13	11	9	10	5.1	
Mobile	57	98	106	30.04	30.10	+ .08	66.8	— 0.1	86	29	75	42	2	59	26	60	56	75	1.22	— 3.5	3	5,208	s.	21	s.	21	8	17	5	4.8	
Montgomery	223	100	112	29.85	30.10	+ .07	66.8	+ 1.4	92	30	78	40	2	55	31	57	50	61	0.71	— 4.1	2	4,274	s.	20	nw.	6	18	9	3	3.5	
Meridian	375	84	93	29.70	30.09	+ .07	65.4	— 0.2	87	30	78	36	2	53	34	....	....	....	2.03	— 2.3	5	3,508	sw.	28	w.	28	11	14	5	4.6	
Vicksburg	247	62	74	29.80	30.08	+ .08	67.2	+ 1.4	84	30	76	38	1	58	26	59	54	68	3.14	— 2.7	5	4,395	s.	24	nw.	28	7	18	5	5.1	
New Orleans	51	88	121	30.04	30.09	+ .09	69.0	0.0	86	30	77	46	1	61	22	63	60	82	1.08	— 4.1	4	5,922	se.	45	se.	13	6	13	11	5.5	
West Gulf States.							**67.4**	**+ 0.3**										**74**	**2.12**	**— 1.7**										**5.8**	
Shreveport	249	77	84	29.79	30.06	+ .09	67.4	+ 1.0	86	10	77	40	1	58	29	58	53	67	0.97	— 4.2	6	5,006	se.	28	w.	13	10	13	7	5.2	
Fort Smith	457	79	94	29.54	30.02	+ .06	64.6	+ 2.4	88	10	76	40	1	54	32	55	49	62	2.21	— 2.9	9	6,850	e.	42	sw.	13	13	9	8	4.7	
Little Rock	357	93	100	29.68	30.05	+ .07	65.1	+ 1.9	88	10	75	39	1	55	31	56	49	62	1.62	— 3.1	8	5,357	s.	31	sw.	8	10	9	11	5.2	
Corpus Christi	20	48	53	29.98	30.00	+ .05	70.3	— 1.0	82	23	74	53	1	66	20	67	65	86	2.96	+ 1.4	6	8,950	se.	33	ne.	17	5	8	17	6.7	
Fort Worth	670	106	114	29.30	30.01	+ .07	66.4	......	86	27	75	45	14	58	29	....	....	....	2.56	— 0.7	8	7,946	s.	36	se.	3	13	9	8	4.5	
Galveston	54	106	112	30.00	30.06	+ .09	68.7	— 0.9	83	23	72	58	1	65	16	65	64	91	0.19	— 2.7	4	8,056	se.	36	se.	2	7	9	14	6.2	
Palestine	510	73	79	29.49	30.02	+ .06	67.0	+ 0.3	85	10	76	44	15	58	30	60	56	75	2.47	— 2.2	8	5,596	s.	34	s.	12	4	11	15	7.1	
San Antonio	701	80	91	29.26	29.98	+ .05	68.8	— 1.3	86	10	78	51	1	60	30	62	58	73	3.94	+ 1.0	12	4,884	se.	25	se.	29	8	10	12	5.8	
Taylor	583	55	63	29.39	30.00	+ .05	68.4	......	86	23	77	46	1	60	31	....	....	....	1.76	......	9	6,715	s.	31	se.	12	8	4	18	6.7	
Ohio Val. and Tenn.							**57.6**	**+ 2.2**										**64**	**2.11**	**— 1.8**										**4.4**	
Chattanooga	762	106	112	29.29	30.10	+ .07	63.0	+ 2.1	87	12	75	35	1	51	35	52	44	56	2.57	— 2.0	6	5,302	w.	48	nw.	27	16	10	4	3.9	
Knoxville	1,004	35	88	29.03	30.08	+ .05	61.2	+ 3.0	87	13	74	34	1	49	39	52	45	62	2.64	— 2.3	11	5,873	sw.	36	sw.	14	11	13	6	4.3	
Memphis	399	76	97	29.67	30.09	+ .09	64.8	+ 2.7	86	11	73	35	1	56	26	58	53	70	1.21	— 4.3	6	6,306	sw.	33	sw.	25	15	9	6	4.1	
Nashville	546	79	91	29.52	30.10	+ .09	62.2	+ 2.4	88	12	74	34	1	51	35	52	43	57	1.75	— 3.0	11	4,561	sw.	32	sw.	13	14	4	12	4.4	
Lexington	989	75	102	29.01	30.09	+ .07	56.6	+ 0.7	84	13	67	27	1	46	32	....	....	....	1.11	— 2.6	8	6,596	sw.	40	w.	9	17	11	2	2.8	
Louisville	525	111	132	29.49	30.09	+ .08	59.2	+ 3.0	87	27	70	30	1	48	35	50	43	61	2.02	— 2.4	11	6,348	sw.	40	w.	20	13	12	5	4.4	
Evansville	431	72	82	29.60	30.07	+ .07	60.0	......	86	28	70	32	1	50	32	....	....	....	1.66	......	6	5,102	sw.	36	s.	8	16	10	4	3.5	
Indianapolis	822	154	164	29.17	30.06	+ .06	55.1	+ 2.2	82	28	65	29	1	45	31	50	46	75	2.13	— 1.6	6	7,109	sw.	56	sw.	9	9	11	10	5.7	
Cincinnati	628	152	160	29.39	30.07	+ .06	57.3	+ 2.7	86	13	68	28	1	47	33	49	41	58	1.20	— 2.0	9	5,139	nw.	36	w.	9	11	10	9	4.9	
Columbus	824	173	190	29.18	30.08	+ .04	54.7	+ 3.5	84	13	65	26	1	44	35	47	40	63	1.16	— 2.0	9	7,132	nw.	60	w.	9	9	11	10	5.1	
Pittsburg	842	336	352	29.14	30.05	+ .03	51.4	+ 0.2	80	29	62	25	1	41	37	45	39	67	1.70	— 1.1	13	7,073	nw.	42	w.	22	14	5	11	5.0	T.
Parkersburg	638	77	84	29.41	30.07	+ .04	55.2	+ 1.4	86	13	66	27	1	44	40	47	40	62	2.54	— 0.4	10	4,522	n.	36	nw.	9	15	8	7	3.9	T.
Elkins	1,940	41	50	28.01	30.08	+ .05	49.2	+ 2.4	82	13	63	20	1	38	50	44	39	72	5.29	+ 1.7	15	3,604	w.	26	sw.	14	12	6	12	5.1	1.7
Lower Lake Region.							**46.0**	**+ 2.2**										**68**	**1.81**	**— 0.5**										**4.9**	
Buffalo	767	178	206	29.18	30.02	+ .01	43.2	+ 1.5	74	29	50	28	1	36	32	38	33	71	2.01	— 0.5	12	9,431	sw.	40	sw.	14	9	11	10	5.5	1.6
Oswego	335	76	91	29.63	30.00	— .01	43.1	+ 0.8	71	14	50	27	3	36	35	39	34	72	1.84	— 0.2	12	7,585	w.	31	se.	9	11	6	13	5.4	1.8
Rochester	523	81	102	29.45	30.03	+ .02	46.3	+ 2.8	75	29	55	28	7	38	35	39	33	64	1.88	— 0.6	11	6,964	w.	29	nw.	24	10	9	11	5.3	1.1
Syracuse	597	97	113	29.36	30.01	.00	44.9	......	72	29	52	26	2	37	33	....	....	....	2.21	......	11	9,100	nw.	41	s.	14	8	14	8	5.3	1.3
Erie	713	92	102	29.25	30.03	+ .01	45.6	+ 1.5	72	19	54	27	1	38	28	40	34	65	2.33	— 0.2	12	7,553	w.	48	s.	9	14	7	9	4.6	0.2
Cleveland	762	190	201	29.21	30.04	+ .02	47.6	+ 1.9	79	13	56	27	1	39	33	44	39	73	1.56	— 0.7	14	8,998	w.	52	nw.	22	14	7	9	4.5	0.7
Sandusky	629	62	70	29.36	30.05	+ .03	49.6	+ 2.6	83	13	58	29	1	41	40	....	....	....	1.50	— 1.0	8	5,787	sw.	39	nw.	22	14	7	9	4.3	
Toledo	628	120	127	29.36	30.05	+ .04	50.6	+ 3.1	81	13	60	25	1	41	38	44	38	65	1.41	— 0.8	9	6,924	sw.	40	sw.	13	16	6	8	4.3	
Detroit	730	153	193	29.24	30.04	+ .02	49.2	+ 3.5	76	29	59	26	1	39	32	42	37	68	1.92	— 0.3	11	7,643	w.	42	sw.	13	13	6	11	5.0	1.0
Upper Lake Region.							**44.9**	**+ 4.2**										**71**	**1.61**	**— 0.7**										**5.1**	
Alpena	609	13	92	29.36	30.03	+ .01	43.4	+ 6.3	74	19	54	25	1	33	36	38	33	73	1.71	— 0.4	10	7,268	nw.	40	e.	9	12	10	8	5.2	0.1
Escanaba	612	40	82	29.36	30.04	+ .02	41.4	+ 5.6	65	26	50	25	2	33	30	36	31	73	1.51	— 0.6	10	6,903	s.	30	e.	8	13	8	9	4.7	1.1
Grand Haven	632	54	92	29.34	30.03	+ .02	45.1	+ 1.5	75	25	53	25	1	37	30	40	36	74	1.60	— 0.9	8	8,053	sw.	35	nw.	22	10	12	8	5.2	T.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, April, 1906*—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Elevation of instruments: Thermometers above ground.	Elevation of instruments: Anemometer above ground.	Pressure, in inches: Actual, reduced to mean of 24 hours.	Pressure, in inches: Sea level, reduced to mean of 24 hrs.	Pressure, in inches: Departure from normal.	Temperature: Mean max. + mean min. ÷ 2.	Temperature: Departure from normal.	Temperature: Maximum.	Temperature: Date.	Temperature: Mean maximum.	Temperature: Minimum.	Temperature: Date.	Temperature: Mean minimum.	Temperature: Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation: Total.	Precipitation: Departure from normal.	Precipitation: Days with .01, or more.	Wind: Total movement, miles.	Wind: Prevailing direction.	Wind: Maximum velocity: Miles per hour.	Wind: Maximum velocity: Direction.	Wind: Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
Up. Lake Reg—Con't.																															
Grand Rapids	707	121	162	29.27	30.04	+ .02	48.4	+ 1.4	77	13	59	26	1	38	30	42	36	69	1.94	— 0.2	11	7,754	w.	37	nw.	22	7	10	13	6.4	T.
Houghton	668	66	74	29.28	30.02	.00	42.0	......	75	17	51	19	5	33	36	....	....	....	1.00	......	9	5,435	e.	28	n.	14	11	10	9	5.1	0.3
Marquette	734	77	116	29.22	30.03	+ .01	43.0	+ 5.8	72	18	51	24	6	35	34	37	29	63	1.08	— 0.9	11	7,213	nw.	36	w.	20	11	8	11	5.2	3.4
Port Huron	638	70	120	29.33	30.03	+ .01	45.6	+ 3.9	74	19	55	27	1	36	34	39	34	71	1.25	— 0.9	11	7,611	ne.	36	w.	14	14	7	9	4.6	0.7
Sault Ste. Marie	614	40	61	29.34	30.05	+ .02	40.2	+ 2.5	69	25	50	21	6	31	36	35	30	72	1.12	— 0.5	9	6,320	nw.	29	nw.	30	11	10	9	5.0	0.7
Chicago	823	140	310	29.15	30.05	+ .05	50.7	+ 5.1	80	25	58	34	1	43	31	44	41	76	1.86	— 1.2	9	9,956	sw.	40	s.	13	10	13	7	4.8	
Milwaukee	681	122	142	29.30	30.05	+ .06	47.2	+ 4.5	70	20	55	28	1	39	29	42	38	77	2.04	— 0.8	7	6,896	w.	30	se.	24	14	9	7	4.1	1.5
Green Bay	617	49	86	29.34	30.00	— .01	45.9	+ 2.9	70	20	55	26	1	36	32	40	35	71	2.05	— 0.5	9	7,531	sw.	38	n.	22	7	9	14	6.3	
Duluth	1,133	11	47	28.76	30.01	.00	43.4	+ 6.4	75	17	52	24	1	35	31	36	30	66	1.51	— 0.9	8	11,382	ne.	48	nw.	21	10	14	6	4.4	5.3
North Dakota.							48.0	+ 6.0										69	1.65	— 0.3										5.2	
Moorhead	940	8	57	28.95	29.98	— .01	47.9	+ 6.6	80	25	59	24	6	37	43	42	39	78	2.50	+ 0.3	5	7,144	nw.	30	sw.	17	8	10	12	5.6	1.6
Bismarck	1,674	15	57	28.18	29.97	.00	48.6	+ 6.5	85	24	61	23	14	36	44	40	32	60	0.85	— 1.4	6	10,269	nw.	46	w.	2	16	8	6	4.3	
Devils Lake	1,482	11	44	28.36	29.95	— .04	45.4	......	86	17	60	14	4	31	46	39	33	70	1.15	......	8	10,623	se.	45	n.	13	13	6	11	4.9	1.0
Williston	1,875	14	44	27.97	29.96	.00	47.4	+ 4.8	84	23	60	14	4	35	37	40	34	68	1.59	+ 0.2	10	8,492	nw.	48	w.	8	10	10	10	5.9	2.6
Upper Miss. Valley.							54.4	+ 3.4										67	1.83	— 1.1										4.8	
Minneapolis	......	102	208	......	......	......	50.4	+ 3.3	80	25	60	28	4	40	33	....	....	....	2.21	— 0.6	9	9,465	nw.	40	nw.	5	8	11	11	....	T.
St. Paul	837	171	179	29.06	29.98	— .01	50.4	+ 5.2	80	25	60	28	6	40	34	44	37	66	2.23	— 0.2	9	7,867	se.	45	nw.	5	7	14	9	5.9	T.
La Crosse	714	71	87	29.22	30.00	+ .02	51.6	+ 4.2	80	25	61	26	1	42	29	....	....	....	0.73	— 1.5	9	4,526	s.	28	n.	22	11	8	11	5.4	0.8
Madison	974	70	78	28.96	30.02	+ .03	48.8	+ 2.8	79	25	58	27	1	39	31	42	36	67	0.90	— 1.5	5	7,274	s.	32	s.	13	11	8	11	5.3	1.2
Charles City	1,015	8	58	28.92	30.00	+ .02	49.2	+ 0.5	78	24	60	27	1	38	37	44	40	76	1.28	— 1.3	11	6,742	se.	30	nw.	5	4	12	14	6.6	2.2
Davenport	606	71	79	29.35	30.01	+ .03	53.6	+ 3.9	80	25	64	28	1	44	33	46	40	66	1.92	— 0.9	7	6,148	nw.	27	nw.	9	10	11	9	5.1	
Des Moines	861	84	101	29.09	30.00	+ .03	53.8	+ 3.3	86	24	64	29	1	43	42	47	41	66	2.96	+ 0.2	10	7,252	se.	35	sw.	13	7	16	7	5.6	
Dubuque	698	100	117	29.28	30.03	+ .05	52.2	+ 3.6	81	25	62	27	1	42	29	45	39	67	1.16	— 1.6	5	5,886	se.	27	s.	25	15	9	6	3.9	1.0
Keokuk	614	63	78	29.36	30.03	+ .05	56.4	+ 4.4	85	24	67	29	1	46	40	48	43	68	2.16	— 1.0	8	6,008	se.	34	w.	9	16	8	6	3.7	
Cairo	356	87	93	29.68	30.07	+ .08	62.0	+ 3.1	85	28	71	36	1	53	31	54	49	66	1.29	— 2.6	5	6,392	s.	30	s.	8	13	7	10	4.9	
La Salle	536	56	64	29.47	30.04	+ .05	53.0	......	80	28	64	27	1	42	36	....	....	....	1.16	......	9	6,306	w.	35	sw.	13	16	6	8	4.2	
Peoria	609	11	45	29.37	30.04	+ .05	54.2	......	82	25	65	26	1	43	33	47	40	65	2.77	......	9	7,482	se.	40	sw.	8	19	6	5	3.7	
Springfield, Ill	644	10	92	29.34	30.03	+ .05	56.4	+ 3.0	83	25	67	28	1	46	32	49	43	66	2.26	— 1.4	9	7,148	se.	31	w.	9	10	13	7	4.8	
Hannibal	534	75	109	29.45	30.02	+ .04	57.0	+ 3.3	86	24	67	30	1	47	37	....	....	....	2.77	0.0	10	7,550	sw.	38	sw.	25	15	9	6	4.0	
St. Louis	567	208	217	29.42	30.03	+ .05	59.8	+ 3.6	87	25	69	31	1	50	34	51	43	59	1.98	— 1.8	8	7,767	se.	42	sw.	12	15	7	8	4.0	
Missouri Valley.							54.8	+ 3.9										65	2.81	— 0.1										5.1	
Columbia, Mo	784	11	84	29.17	30.01	+ .03	58.2	+ 1.8	87	24	70	31	1	47	37	....	....	....	1.96	— 1.0	10	6,981	se.	36	sw.	8	18	4	8	3.8	
Kansas City	963	78	95	28.99	30.03	+ .07	59.9	+ 5.5	87	24	70	35	1	49	31	50	44	63	2.51	— 0.4	10	6,191	se.	34	sw.	27	14	10	6	4.2	
Springfield, Mo	1,324	98	104	28.62	30.02	+ .05	60.4	+ 2.9	83	24	71	34	1	50	30	53	48	69	2.10	— 1.7	7	8,791	se.	45	sw.	8	16	9	5	3.8	
Iola	984	40	47	28.96	30.00	+ .05	61.4	......	86	23	73	36	1	49	36	....	....	....	2.26	......	8	6,871	s.	31	sw.	24	9	11	10	5.8	
Topeka	......	85	89	......	......	......	59.4	+ 2.6	88	24	71	34	1	48	39	....	....	....	2.13	— 0.6	9	7,261	s.	36	sw.	27	11	14	5	4.6	
Lincoln	1,189	11	84	28.69	29.96	+ .02	55.6	+ 4.6	90	24	67	32	15	44	40	47	42	68	3.51	+ 0.9	11	9,426	se.	44	nw.	8	11	6	13	5.9	T.
Omaha	1,105	115	121	28.79	29.98	+ .03	55.4	+ 4.4	90	24	66	34	6	45	39	47	40	63	3.67	+ 0.5	9	7,432	n.	33	nw.	25	8	8	14	6.4	T.
Valentine	2,598	47	54	27.24	29.96	+ .02	49.6	+ 2.4	91	23	63	20	4	37	45	42	34	64	2.68	— 0.2	10	10,122	nw.	68	nw.	24	12	11	7	4.6	2.7
Sioux City	1,135	96	164	28.76	29.98	+ .03	52.0	+ 4.0	88	24	63	29	6	41	45	....	....	....	3.94	+ 0.9	11	11,188	se.	42	w.	25	7	8	15	6.1	0.2
Pierre	1,572	43	50	28.30	29.96	+ .01	52.5	+ 6.2	88	24	65	23	4	40	42	43	35	60	2.62	+ 0.7	10	7,662	se.	49	nw.	24	8	14	8	5.6	5.2
Huron	1,306	56	67	28.56	29.97	+ .01	48.8	+ 4.4	90	24	61	22	4	36	49	42	36	68	2.58	— 0.4	9	10,837	nw.	45	nw.	25	16	7	7	4.4	
Yankton	1,233	49	57	28.64	29.96	+ .01	51.2	+ 4.5	88	24	62	27	4	40	47	....	....	....	3.24	+ 0.2	8	7,954	nw.	43	nw.	13	7	6	17	6.5	
Northern Slope.							48.1	+ 3.5										60	1.64	0.0										4.5	
Havre	2,505	11	44	27.33	29.97	+ .04	49.4	+ 5.4	89	22	64	14	3	35	47	40	31	55	0.09	— 0.9	3	7,402	nw.	37	n.	2	18	9	3	3.8	0.1
Miles City	2,371	26	48	27.46	30.02	+ .06	51.9	+ 5.3	90	23	65	20	4	39	41	42	34	57	1.60	+ 0.5	8	5,489	nw.	36	nw.	2	12	11	7	4.5	1.3
Helena	4,110	8	56	25.82	30.04	+ .07	47.4	+ 3.9	83	22	59	22	3	36	40	37	27	51	0.83	— 0.3	8	5,430	sw.	33	w.	7	12	10	8	4.8	1.6
Kalispell	2,962	8	34	26.94	30.01	+ .05	47.3	......	82	21	62	25	12	33	43	37	28	56	0.46	......	3	4,162	nw.	27	sw.	7	19	9	2	3.1	
Rapid City	3,234	46	50	26.57	29.99	+ .04	49.5	+ 2.9	85	23	62	18	4	37	41	42	35	63	0.65	— 1.6	4	3,487	nw.	32	nw.	12	17	6	7	4.2	T.
Cheyenne	6,088	56	64	23.98	29.98	+ .07	43.2	+ 2.3	74	23	54	16	3	32	38	36	29	64	3.10	+ 1.7	10	7,755	nw.	39	s.	1	10	10	10	5.2	10.4
Lander	5,372	26	36	24.64	30.02	+ .08	43.6	+ 1.6	74	21	56	16	4	31	39	36	29	64	2.29	— 0.4	13	3,197	sw.	34	sw.	23	8	9	13	5.6	9.7
Yellowstone Park	6,200	11	48	23.87	30.04	+ .08	38.2	......	68	21	50	4	3	26	42	31	23	61	1.24	......	8	6,176	nw.	36	nw.	1	10	15	7	4.7	10.5
North Platte	2,821	11	51	27.04	29.96	+ .04	51.9	+ 3.3	90	23	66	24	5	38	46	45	40	71	2.89	+ 0.7	14	7,678	se.	59	n.	13	14	5	11	4.7	0.9
Middle Slope.							56.0	+ 1.8										62	2.86	+ 0.7										4.8	
Denver	5,291	129	136	24.70	29.96	+ .06	48.6	+ 1.7	79	23	60	20	3	37	36	39	29	54	3.67	+ 1.6	10	6,488	n.	52	n.	12	10	10	10	5.3	10.6
Pueblo	4,685	80	86	25.24	29.92	+ .04	51.6	+ 1.1	81	23	64	28	4	39	42	40	29	51	1.82	+ 0.4	9	6,859	e.	55	w.	24	12	12	6	4.4	0.2
Concordia	1,398	42	47	28.49	29.97	+ .04	56.9	+ 1.6	90	23	68	32	15	46	42	49	42	66	2.02	— 0.3	12	6,968	s.	34	s.	24	8	12	10	5.6	
Dodge	2,509	84	54	27.35	29.94	+ .04	56.6	+ 2.9	89	23	70	31	3	43	45	48	42	69	1.79	+ 0.2	7	10,361	se.	48	s.	7	12	14	4	4.7	
Wichita	1,358	78	86	28.56	29.99	+ .06	60.2	+ 2.4	86	23	72	37	14	48	38	52	45	64	3.09	+ 0.1	7	7,580	s.	34	sw.	27	14	11	5	4.2	
Oklahoma	1,214	79	86	28.70	29.98	+ .06	62.3	+ 1.3	86	10	73	37	14	51	32	54	48	67	4.77	+ 2.1	11	12,357	s.	54	sw.	24	10	14	6	4.5	
Southern Slope.							60.4	0.0										61	2.78	+ 1.1										5.0	
Abilene	1,738	45	54	28.19	29.98	+ .08	65.0	— 0.3	90	26	76	41	14	54	32	55	48	63	2.41	— 0.3	8	6,878	se.	33	s.	24	9	10	11	5.4	
Amarillo	3,676	10	49	26.24	29.95	+ .08	55.7	+ 0.4	82	23	68	31	4	43	40	46	38	63	3.23	+ 1.5	8	9,516	se.	40	nw.	27	16	3	11	4.2	
Del Rio	944	8	57	28.97	29.94	+ .08	70.4	......	97	25	81	44	14	60	37	....	....	....	1.04	......	12	6,954	se.	30	se.	15	8	7	15	6.4	
Roswell	3,578	9	57	26.30	29.90	+ .05	58.0	......	84	11	72	35	14	44	42	48	37	58	2.70	+ 2.2	7	5,390	s.	28	nw.	8	16	8	6	4.2	
Southern Plateau.							56.6	— 1.5										46	0.85	+ 0.3										3.4	
El Paso	3,762	10	110	26.14	29.86	+ .05	63.7	— 0.1	87	23	78	41	7	50	38	42	32	39	0.40	+ 0.2	2	8,567	e.	51	w.	24	18	9	3	3.0	
Santa Fe	7,013	33	39	23.21	29.90	+ .06	47.1	+ 0.5	69	23	58	25	13	36	33	37	25	49	2.23	+ 1.5	11	6,849	sw.	48	se.	3	18	8	4	3.7	0.3
Flagstaff	6,907	12	44	23.29	29.86	+ .02	41.6	— 2.1	68	21	55	14	30	28	38	33	25	59	0.71	— 0.9	7	6,378	sw.	44	sw.	23	15	6	9	4.3	3.4
Phoenix	1,108	50	56	28.74	29.89	+ .02	65.3	— 1.7	96	22	79	38	3	52	36	50	36	40	0.48	+ 0.2	4	3,552	e.	23	sw.	1	19	9	2	2.9	
Yuma	141	16	46	29.76	29.91	+ .02	67.6	— 2.5	98	21	81	41	4	54	36	54	41	45	0.91	+ 0.8	2	4,539	w.	32	w.	28	24	5	1	1.3	
Independence	3,910	11	42	25.95	29.94	+ .04	54.3	— 3.0	80	20	66	31	2	42	33	42	28	44	0.36	+ 0.2	4	6,771	nw.	36	se.	27	10	15	5	4.9	
Middle Plateau.							48.3	+ 0.1										56	1.87	+ 0.8										5.2	
Reno	4,532	56	63	25.46	30.00	+ .03	47.2	+ 0.3	81	20	60	20	4	34	44	38	29	55	0.78	+ 0.3	3	4,752	w.	28	s.	22	13	11	6	4.0	0.5
Winnemucca	4,344	18	56	25.61	30.01	+ .03	47.8	+ 0.5	81	20	62	23	12	34	42	38	28	56	0.88	— 0.1	6	5,260	ne.	32	ne.	3	15	6	9	4.5	2.0
Modena	5,479	10	43	24.57	29.92	+ .04	45.2	+ 0.7	74	21	58	22	2	33	40	36	25	53	2.91	+ 2.2	11	8,536	w.	58	sw.	23	9	8	13	5.9	4.6
Salt Lake City	4,366	105	110	25.58	29.95	+ .03	49.3	— 0.2	78	21	59	28	2	40	30	41	32	58	3.08	+ 0.9	13	5,004	nw.	45	sw.	23	9	9	12	5.8	6.5
Durango	6,546	18	56	23.60	29.90	+ .05	45.1	......	71	21	58	23	13	32	37	36	28	59	1.79	+ 0.6	13	4,850	nw.	38	s.	1	8	11	11	5.8	2.3
Grand Junction	4,608	43	51	25.33	29.90	+ .05	52.2	— 1.0	80	22	64	31	3	40	33	42	32	54	1.78	+ 1.1	13	4,043	e.	34	s.	23	10	11	9	5.2	T.
Northern Plateau.							52.0	+ 2.6										53	0.56	— 0.8										4.2	
Baker City	3,471	48	58	26.47	30.07	+ .07	47.5	+ 2.9	78	21	60	27	12	35	38	38	27	51	0.27	— 0.9	6	6,165	s.	33	nw.	2	17	7	6	3.9	
Boise	2,739	78	86	27.18	30.04	+ .06	52.2	+ 1.3	85	21	64	28	1	41	34	42	30	48	1.40	+ 0.2	6	5,268	nw.	32	w.	11	11	12	7	4.9	5.7
Lewiston	757	10	51	29.25	30.06	+ .07	56.0	+ 3.0	91	21	70	33	12	42	44	....	....	....	0.07	— 0.9	2	4,115	e.	40	w.	9	14	12	4	3.9	
Pocatello	4,477	46	54	25.48	30.01	+ .07	46.6	— 0.2	76	22	58	22	3	35	36	38	28	57	1.16	— 0.4	11	5,819	se.	27	w.	7	13	14	3	4.0	2.4
Spokane	1,929	101	110	27.99	30.05	+ .06	52.4	+ 4.4	87	21	65	28	12	39	40	42	32	52	0.39	— 1.0	5	4,123	sw.	29	w.	7	10	11	9	5.2	
Walla Walla	1,000	71	79	28.98	30.05	+ .04	57.2	+ 3.9	89	20	70	35	2	45	39	48	40	55	0.04	— 1.6	2	4,159	s.	28	ne.	29	20	9	1	3.4	
N. Pac. Coast Reg.							51.3	+ 2.7										74	1.47	— 2.7										6.1	
North Head	211	11	56	29.90	30.13	+ .08	50.0	+ 2.0	88	20	55	40	1	45	38	47	45	86	2.04	— 3.4	13	10,847	nw.	60	se.	8	13	10	7	5.0	
Port Crescent	259	12	29	29.83	30.11	+ .09	46.8	+ 2.2	76	29	55	29	12	39	38	....	....	....	0.89	— 3.2	9	3,862	nw.	17	ne.	20	8	9	13	6.2	
Seattle	123	185	224	29.99	30.12	+ .09	53.0	+ 3.1	74	30	62	35	12	44	31	46	40	67	0.34	— 2.5	6	5,286	w.	36	se.	8	8	11	11	5.8	
Tacoma	213	113	120	29.89	30.12	+ .09	52.0	+ 3.1	78	30	62	31	12	42	34	....	....	....	1.09	— 2.4	6	3,726	n.	27	sw.	8	7	7	16	6.5	
Tatoosh Island	86	7	57	30.01	30.10	+ .10	48.5	+ 2.4	61	29	53	39	11	44	13	45	42	82	2.27	— 5.1	12	8,870	e.	58	s.	8	4	7	19	7.9	
Portland, Oreg.	153	68	96	29.93	30.09	+ .03	55.6	+ 4.0	90	20	61	34	2	45	38	48	43	68	2.02	— 1.3	10	3,739	nw.	26	w.	8	8	10	12	5.9	T.
Roseburg	510	9	57	29.54	30.10	+ .03	53.4	+ 2.2	91	20	67	29	2	40	48	46	40	70	1.63	— 1.0	11	2,485	nw.	26	nw.	1	10	11	9	5.2	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, April, 1906*—Continued.

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
Mid. Pac. Coast Reg.							**56.0**	**+ 1.5**										**70**	**1.36**	**− 1.1**										**4.1**	
Eureka	62	62	80	30.05	30.12	+ .01	51.8	+ 1.8	66	5	57	38	1	46	22	49	46	82	2.14	− 2.1	10	6,845	n.	44	n.	2	12	9	9	4.6	
Mount Tamalpais	2,375	11	18	27.58	30.06	+ .01	50.8	......	73	20	57	33	1	44	20	45	38	68	0.98	......	4	13,339	nw.	70	nw.	27	14	10	6	4.2	T.
Point Reyes Light	490	7	18	29.51	30.02	.....	53.8	+ 3.4	75	5	58	43	1	49	24	....	....	....	0.80	− 0.9	5	17,712	nw.	74	nw.	10	14	12	4	4.2	
Red Bluff	332	50	56	29.66	30.02	− .01	59.7	+ 0.4	85	19	71	37	1	48	35	51	42	60	1.75	− 0.4	5	4,532	se.	26	n.	2	18	2	10	4.0	
Sacramento	69	106	117	29.96	30.02	+ .01	58.4	+ 0.2	81	20	68	44	25	49	27	51	45	66	1.21	− 1.1	6	6,858	s.	35	nw.	2	18	3	9	3.7	
San Francisco †	155	161	167	29.97	30.08	+ .03	56.4	+ 1.8	76	5	63	43	28	50	25	51	47	76	0.92	− 1.0	4	......	w.	...	......	...	...	...	...	...	...
San Jose ‡	141	78	88	......	......	......	......	......	...	...	...	...	...	...	...	...	...	...	......	......	...	......	......	...	......	...	...	...	...	...	...
Southeast Farallon	30	9	17	30.04	30.07	......	54.1	......	66	5	57	46	1	52	12	....	....	....	0.78	......	5	13,107	nw.	54	nw.	28	15	10	5	4.0	
S. Pac. Coast Reg.							**58.0**	**− 0.6**										**71**	**0.82**	**− 0.6**										**3.8**	
Fresno	330	67	70	29.68	30.04	+ .05	58.0	− 2.8	93	20	69	34	2	47	37	50	43	63	0.92	− 0.4	4	4,004	nw.	34	nw.	1	17	8	5	3.6	
Los Angeles	338	116	123	29.64	30.00	+ .01	59.2	+ 0.3	92	20	69	39	2	50	33	51	46	69	0.69	− 0.7	4	4,120	w.	26	sw.	28	9	11	10	5.4	
San Diego	87	94	102	29.91	30.00	+ .01	58.2	− 0.1	88	20	65	42	2	51	32	53	49	76	0.98	+ 0.2	5	4,694	nw.	26	nw.	1	22	3	5	2.8	
San Luis Obispo	201	47	54	29.84	30.06	+ .01	56.8	0.0	90	19	68	38	29	46	39	50	46	75	0.71	− 1.3	2	4,465	nw.	26	w.	27	17	11	2	3.4	
West Indies.																															
Grand Turk	11	6	20	30.03	30.04	+ .03	77.4	......	88	28	83	66	4	72	...	...	...	...	2.06	......	6	......	e.	...	......	...	...	...	...	...	
San Juan	82	48	90	29.92	30.00	+ .02	77.2	− .01	89	1	82	67	3	72	18	71	68	75	6.55	+ 3.0	15	8,635	e.	30	n.	3	5	11	14	6.7	
Panama.																															
Ancon	....	....	....	29.75	29.82	......	83.0	......	96	*	91	70	13	75	23	76	73	83	7.77	......	9	......	n.	...	......	...	0	15	15	7.0	
Naos	....	....	....	29.79	29.83	......	82.2	......	94	16	90	71	13	75	21	76	74	86	6.56	......	8	7,062	nw.	35	ne.	3	0	16	14	7.2	

* More than one date. † Instruments destroyed by fire following earthquake on the 18th; record for 28½ days. ‡ Instruments destroyed by fire following earthquake on the 18th.

TABLE II.—*Climatological record of cooperative observers, April, 1906.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alaga	.....	.....	.....	2.00	
Ashville	88	32	62.4	1.67	
Auburn	90	39	65.4	0.93	
Bermuda	95	32	65.1	0.57	
Boligee	91	38	66.4	0.91	
Bridgeport	.....	.....	.....	2.43	
Burkeville	.....	.....	.....	0.31	
Calera	.....	.....	.....	0.61	
Camp Hill	91[e]	34[e]	65.5[e]	1.00	
Cedar Bluff	.....	.....	.....	1.02	
Citronelle	89	40[f]	67.2[e]	1.69	
Clanton	92	34	64.4	0.89	
Cordova	.....	.....	.....	1.46	
Dadeville	.....	.....	.....	0.40	
Daphne	85	40	67.0	0.65	
Decatur	90	34	64.4	0.73	
Demopolis	.....	.....	.....	1.12	
Eufaula	90	33	63.2	0.82	
Evergreen	92	35	65.9	0.85	
Florence	90	32	63.8	2.36	
Fort Deposit	92	37	66.0	1.54	
Gadsden	91	34	65.5	0.62	
Goodwater	92	35	65.2	1.10	
Greensboro	88	39	66.2	1.14	
Greenville	.....	.....	.....	0.45	
Guntersville	.....	.....	.....	1.26	
Hamilton	90	33	63.1[e]	0.79	
Highland Home	96	38	67.7	0.52	
Livingston	89	43[d]	65.6	1.57	
Lock No. 4	89	34	64.0	1.24	
Madison Station	89	30	65.4	0.25	
Maplegrove	93	32	62.0	1.02	
Marion	91	38	66.2	0.71	
Milstead	.....	.....	.....	0.76	
Newbern	89	37	65.6	1.22	
Notasulga	.....	.....	.....	0.62	
Oneonta	88	31	62.8	0.93	
Opelika	95	35	66.0	1.28	
Ozark	93	32	65.8	0.61	
Prattville	91	33	64.0	0.66	
Pushmataha	92	35	66.1	1.28	
Riverton	91	30	62.4	0.86	
Scottsboro	88	32	62.2	0.46	
Selma	94	37	67.0	0.54	
Springhill	83	43	66.8	0.00	
Talladega	92	34	65.1	6.61	
Tallassee	.....	.....	.....	1.41	
Thomasville	87[d]	50[e]	70.3[e]	0.40	
Tuscaloosa	91	28	64.3	1.30	
Tuscumbia	88	34	63.8	0.65	
Tuskegee	93	37	67.0	1.27	
Union Springs	91	36	66.1	2.00	
Uniontown	90	39	66.7	1.42	
Valleyhead	90	30	61.6	2.00	
Vienna	.....	.....	.....	0.36	
Wetumpka	94	37	66.2	1.15	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alaska.	°	°	°	*Ins.*	*Ins.*
Fort Liscum	48	18	35.4	4.20	31.6
Juneau	56	29	44.8	3.03	2.0
Killisnoo	55	28	40.8	5.15	
Sitka	59	31	41.9	10.64	
Arizona.					
Allaire Ranch	.....	.....	.....	0.17	
Alpine	.....	.....	.....	0.60	
Arizona Canal Co. Dam	99	35	65.6	0.55	
Aztec	101	41	70.6	T.	
Benson	88	34	61.8	0.15	
Bisbee	78	36	57.6	0.05	
Blue	78	26	52.2	1.18	
Bonita	.....	.....	.....	0.20	
Bowie	90	34	65.6	0.00	
Buckeye	99	32	63.0	1.04	
Casagrande	101	28	62.7	0.57	
Casa Grande Ruins	.....	.....	.....	0.60	
Clifton	.....	.....	.....	0.35	
Cline	89	32	60.0	0.67	
Cochise *1	88	32	59.7	0.15	
Congress	96	37	61.2	1.02	
Douglas	89	33	62.2	0.15	
Dudleyville	91	33	61.9	0.75	
Duncan	86	30	57.6	0.13	
Fort Apache	77	22	52.4	1.54	
Fort Huachuca	81	33	58.1	0.24	
Fort Mohave	99	39	68.2	0.73	
Gilabend	100	35	67.6	0.10	
Grand Canyon	70	12	37.2	1.03	9.7
Greaterville	79	31	54.6	0.28	
Greer	.....	.....	.....	1.30	T.
Holbrook	82	25	52.0	0.50	
Huachuca Res	.....	.....	.....	0.33	
Jerome	80	31	55.6	1.60	
Keams Canyon	74	22	47.5	0.66	T.
Kingman	86	26	57.0	1.31	T.
Maricopa	103	32	67.3	0.46	
Mesa	100	34	64.8	0.63	
Mohawk Summit *1	100	49	66.7	0.50	
Mount Union	.....	.....	.....	2.50	21.5
Natural Bridge	.....	.....	.....	1.00	
Oak Springs	.....	.....	.....	1.40	T.
Oracle	82	35	58.3	1.21	
Paradise	78	31	55.8	0.03	
Parker	103	38	67.4	0.59	
Phoenix	97	33	63.5	0.42	
Picacho *1	96	50	68.9	0.25	
Pinal Ranch	.....	.....	.....	0.45	
Pinto	.....	.....	.....	0.40	
Prescott	76	23	49.5	1.10	7.1
Roosevelt	100	40	69.0	0.72	
St. Michaels	73	22	45.0	0.33	T.
San Carlos	86	33	60.5	0.63	
San Simon	88	30	59.0	0.18	
Seligman	74	21	48.8	0.64	2.0
Sentinel *1	101	40	69.4	0.12	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
Signal	97	42	64.8	0.67	
Silver Bell	91	38	66.1	0.21	
Tempe	100	32	64.8	0.72	
Thatcher	87	32	59.8	0.33	
Tombstone	81	38	59.8	0.10	
Tuba	82	25	52.6	0.19	0.4
Tucson	92	31	62.0	0.50	
Walnut Grove	.....	.....	.....	1.40	
Willcox	88	30	57.9	0.25	
Williams	71	27	49.1	2.16	21.6
Yarnell	.....	.....	.....	1.66	3.0
Young	83	21	54.2	0.25	
Yuma (Date Orchard)	102	28	64.8	0.10	
Arkansas.					
Alicia	.....	.....	.....	3.80	
Amity	88	33	62.0	2.12	
Arkadelphia	90	33	64.2	2.34	
Arkansas City	.....	.....	.....	0.70	
Arnett	84	35	61.2	4.81	
Batesville	90	30	64.6	1.61	
Beebranch	88	27	61.4	3.00	
Boonville	93	37	65.6	1.90	
Brinkley	90	30	64.6	3.21	
Calico Rock	.....	.....	.....	1.70	
Camden	86	35	64.4	1.88	
Center Point	.....	.....	.....	4.82	
Clarendon	.....	.....	.....	1.22	
Conway	92	33	65.4	2.08	
Cornerstone	99	34	65.4	3.80	
Corning	87	29	63.4	2.32	
Dardanelle	.....	.....	.....	1.76	
Des Arc	89	31	65.0	1.82	
Dodd City	87	27	61.4	2.80	
Dutton	86	31	60.2	4.30	
Eldorado	88	33	65.0	1.75	
Eureka Springs	89	30	62.0	3.01	
Fayetteville	85	35	62.6	1.90	
Forrest City	88	30	63.6	1.48	
Fulton	.....	.....	.....	2.24	
Hardy	86	29	62.8	1.76	
Harrison	90	27	61.2	2.53	
Heber	90	27	63.1	1.26	
Helena	88	30	64.2	2.85	
Hope	91	37	65.2	2.91	
Huntsville	86	34	61.6	1.95	
Jonesboro	91	28	65.1	4.24	
Junction	90	28	63.6	2.45	
Lake Village	89	30	65.6	1.33	
Lewisville	90	37	65.4	3.33	
Lutherville	87	31	63.0	2.69	
Luxora	.....	.....	.....	2.75	
Malvern	87	32	61.2	2.60	
Marked Tree	.....	.....	.....	3.30	
Marvell	89	30	65.0	2.08	
Mena	86	33	63.4	2.83	
Mountain Home	.....	.....	.....	2.07	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Arkansas—Cont'd.					
Newport	97	34	66.6	1.42	
Oregon				2.53	
Ozark	90	36	65.0	2.67	
Pinebluff	90	32	64.2	4.58	
Pond	87	30	61.2	3.90	
Prescott	92	37	65.3	2.43	
Princeton	90	29	63.4	3.94	
Rison	90c	30c	64.6c	2.18	
Rogers	87	34	62.3	2.36	
Russellville	88	32	63.4	3.65	
Spielerville	88	37	65.4	2.74	
Stuttgart	88	30	63.6	2.68	
Texarkana				4.15	
Warren	92	28	65.2	1.70	
White Cliffs				0.91	
Wiggs	87	29	62.4	1.90	
Winchester	90	31	64.2		
Witts Springs	80	32	58.3	2.73	
California.					
Alturas	80	20	47.0	0.66	
Auburn	82	41	61.2	2.64	
Bagdad	97	45	67.8	0.60	
Bakersfield	98	36	59.7	1.34	
Barstow	89	31	57.2	0.25	
Bear Valley				3.52	4.0
Berkeley	81	40	56.8	0.74	
Bishop	84	23	50.8	0.74	
Blocksburg	84	28	53.0	2.41	
Blue Canyon	70	15	43.2	7.42	18.0
Branscomb	84	26	50.6	3.11	T.
Brush Creek	84	28	52.8	2.29	
Butte Valley				0.96	
Calexico	94	48	68.6	0.29	
Campbell	88	35	55.0	1.11	
Campo				1.60	
Cedarville	84	15	47.6	0.68	T.
Chico	84	36	60.1	1.72	
Claremont	90	33	57.8	1.51	
Cloverdale	87	36	58.2	1.55	
Colfax	85	27	53.2	2.72	
Colusa	81	32	55.9	0.87	
Craftonville				3.67	
Crescent City	72	33	51.4	3.77	
Crockers				5.58	
Cuyamaca	68	24	42.4	3.54	11.0
Delta	93	31	59.5	3.16	
Dobbins	88	38	59.8	2.48	
Durham	87	35	58.8	1.89	
Elcajon	94	36	59.4	1.66	
Electra	90	39	59.1	3.38	
Elmwood	88	23	56.8	1.50	
Elsinore	92	32	58.6	0.93	
Emigrant Gap	66	22	43.2	5.30	28.0
Escondido	89	29	53.8	1.59	
Folsom	89	36	59.3	2.46	
Fordyce				3.65	15.0
Fort Bragg				0.65	
Fort Ross	73	35	52.6	2.22	
Georgetown	81	27	52.0	4.68	
Gilroy (near)	90	34	57.8	1.08	
Glendora				1.62	
Gold Run	78	26	55.5	2.22	
Grass Valley				2.71	
Greenville	81	25	48.7	0.76	
Hanford	95	25	58.6	0.62	
Healdsburg	90c	34c	59.0c	0.79	
Heber	100	39	68.0	0.12	
Hollister	84	32	55.4	1.04	
Indio	98	42	69.1	0.47	
Idylwild	75	15	45.3	3.19	7.9
Imperial	106	37	69.2	0.25	
Iowa Hill	83	31	53.6	3.60	
Irvine				1.30	
Isabella				1.05	
Jamestown	88	30	56.6	3.68	
Kennedy Gold Mine				3.39	
Kentfield				1.06	
King City	92	28	53.2	0.46	
Laporte	70	17	42.6	3.46	13.4
Laytonville				2.56	
Le Grand	82	32	54.7	2.18	
Lemoncove	94	34	59.8	2.91	
Lick Observatory	74	23	45.6	1.83	0.2
Lodi	87	36	57.4	1.95	
Lone Pine	83	31	53.8	0.23	T.
Los Gatos	88	37	56.6	1.01	
Lowe Observatory				2.28	
Magalia	84	26	55.1	4.48	
Mammoth	98	32	65.2	1.40	
Marysville	85	38	60.2	2.23	
Merced	86	32	57.6	1.80	
Mercury				1.00	
Mills College				0.62	
Milo				3.05	
Milton (near)	83	34	57.6	2.03	
Mohave	80	30	56.5	1.50	
Mokelumne Hill	84	32	54.3	4.09	
Mono Ranch	80	26	49.3	1.36	
California—Cont'd.					
Montague	88	25	52.7	0.62	
Monumental	85	30	49.2	4.31	
Mountainview				0.68	
Mount St. Helena				0.95	
Napa	85	38	57.4	0.43	
Needles	98	46	70.2	0.50	
Nellie				3.86	6.2
Nevada City	84	26	50.8	2.68	
Newcastle	88	30	57.8	2.42	
Niles	86	38	56.6	1.33	
Nimshew	85	36	56.4	3.78	
North Bloomfield	83	21	50.1	2.36	
Oakland	81	41	58.2	0.95	
Ojai Valley	93	30	56.2	0.57	
Orleans	98	33	62.4	2.21	
Oroville (near)	88	32	59.2	1.28	
Ozena				0.57	
Palermo	86	34	58.8	1.25	
Peachland	84	33	56.0	1.11	
Pilot Creek				4.43	0.5
Pine Crest	87	38	57.8	1.15	
Placerville	80	29	53.2	3.85	
Point Lobos	70	43	58.6	0.17	
Porterville	90	33	59.8	2.20	
Poway	89	37	59.3	1.06	
Quincy	78	23	47.4	1.01	1.0
Reedley	93	31	58.1	1.78	
Represa				2.45	
Rialto	90	30	59.0	2.37	
Riovista	82	36	57.7	1.80	
Riverside	93	31	58.2	1.57	T.
Rocklin	87	37	58.5	2.35	
Rohnerville	85	34	54.8	1.93	
Sacramento	81	41	59.0	1.56	
Salinas	87	35	57.2	0.55	
San Bernardino	93	30	59.0	1.16	
San Jacinto	94	31	59.0	0.94	
San Leandro	86	34	56.6	0.76	
Santa Barbara	86	40	57.8	0.83	
Santa Cruz	90	34	56.9	1.50	
Santa Maria	89	36	58.0	0.55	
Santa Monica	81	36	54.9	1.32	
Santa Rosa	83	34	55.4	0.72	
Shasta	96	34	61.4	2.34	
Sierra Madre	86	37	57.3	2.84	
Sisson	82	25	48.7	1.35	
Sonoma	83	37	55.9	0.63	
Sonora	91	29	59.2	4.50	
Sterling	80	23	49.7	4.09	3.0
Stockton	87	40	54.1	1.74	
Storey	88	32	54.2	0.71	
Summerdale	72	16	42.6	5.91	17.0
Summit	65	18	44.8	2.60	26.0
Susanville	78	22	47.6	0.27	
Tamarack	56	8	39.7	5.23	28.0
Tejon	86	37	54.6	1.32	
Towle	78	18	48.1	4.76	8.0
Truckee	66	20	44.8	1.26	6.0
Tulare	94	32	58.8	1.33	
Tustin				0.70	
Ukiah	89	31	56.2	1.71	
Upland	87	32	62.1	2.42	
Upperlake	86	33	57.4	1.07	
Upper Mattole				3.39	
Vacaville	84	37	57.8	0.58	
Visalia	91	30	57.9	1.30	
Wasco	92	30	57.8	0.82	
Wasioja				0.69	
Westpoint				6.96	
Wheatland	83	37	58.0	1.54	
Woodleaf				3.30	
Yreka				0.31	
Zenia	81	26	49.8	3.43	
Colorado.					
Akron				4.22	8.0
Alford	74	12	43.8	3.52	8.5
Antelope Springs	65	3	34.8	2.37	18.0
Arriba				5.36	12.0
Ashcroft	64	8	33.8	2.88	20.0
Blaine	80	16	47.8	2.38	4.0
Boulder	79	20	50.3	5.32	8.0
Breckenridge	62	5	34.2	3.98	43.0
Burlington	85	22	49.6	3.89	T.
Canyon	80	26	53.8	1.66	T.
Calham				2.91	12.0
Cardinal	62	5	35.9	6.72	53.0
Castlerock	79	16	46.8	4.30	18.0
Cheesman	73	19	43.7	3.29	12.0
Cheyenne Wells	78	25	51.0	3.74	3.5
Chromo	69	18	33.0	1.68	4.6
Clearview	60	2	35.6	1.55	19.0
Collbran	77	23	46.8	4.09	10.2
Colorado Springs	77	23	46.9	2.06	1.0
Cripplecreek				2.69	26.4
Delta	81	27	51.6	2.48	
Eagle	69	17	42.6	2.77	10.5
Fort Collins	79	22	47.2	4.30	1.3
Fort Morgan	87	25	51.4	2.09	
Colorado—Cont'd.					
Fowler				3.06	0.5
Frances	64	11	37.6	5.67	51.0
Fruita	79	28	51.2	1.69	
Garnett	74	11	41.6	1.06	T.
Gleneyre	78	19	46.6	2.48	
Glenwood Springs	76	21	45.8	2.10	
Grand Valley	79	28	49.6	3.11	0.5
Greeley	82	22	50.6	3.04	1.0
Gunnison	70	12	39.7	0.79	6.0
Hahns Peak	67	10	34.8	2.39	18.0
Hamps	79	23	47.2	4.17	6.5
Hoehne	80	16	46.8	2.26	T.
Holly	90	20	58.4	2.96	0.5
Idaho Springs	72	14	43.1	4.19	21.0
Lake City	64	15	40.2	1.50	5.0
Lake Moraine	55	8	32.2	2.09	28.0
Lamar	87	28	55.6	3.11	4.0
Laporte				4.46	2.0
Las Animas	90	25	53.9	3.40	T.
Lay	73	18c	42.0c		
Leroy	83	21	48.5	4.53	7.0
Longs Peak	61	2	33.2	4.45	42.0
Loveland				3.35	3.0
Mancos	72	23	45.0	3.46	15.0
Manassa	75	16	42.6	0.07	
Meeker	74	22	43.8	4.12	7.0
Montrose	76	22	46.0	2.04	2.0
Moraine	65	8	39.3	2.63	29.0
Pogoda	75	18	43.1	2.88	8.0
Paonia	78	23	49.1	3.51	9.0
Platte Canon				5.71	4.0
Rockyford	84	15	52.0	5.59	
Saguache	70	18	42.6	0.39	2.0
Salida	72	18	44.2	3.41	21.0
San Louis	68	14	42.0	0.05	
Santa Clara	70	13	42.2	4.87	25.0
Sapinero	66	13	38.4	2.28	16.5
Sheridan Lake	87	20	53.2	2.58	3.0
Silt	77	25	46.8	2.99	3.0
Silverton	61	8	33.2	3.85	19.0
Stonewall				1.61	4.0
Sugar City				4.86	T.
Trinidad	79	24	48.3	1.49	2.0
Victor	68	11	42.6	2.65	29.7
Vilas				2.83	
Wagon Wheel	67	9	37.6	1.46	18.0
Waterdale	83	21	48.6	3.82	T.
Westcliffe	68	16	41.9	1.79	17.0
Whitepine	53	5	31.2	2.00	20.0
Wray	88	28	52.9	4.82	T.
Yuma				4.45	
Connecticut.					
Bridgeport	75	25	49.0	5.87	
Canton	74	20	45.8	4.97	2.0
Colchester	72	20	46.2	4.53	T.
Falls Village				4.27	6.5
Hawleyville	74	24	46.8	5.59	2.0
Lake Konomoc				4.05	
New London	74	20	47.5	3.82	T.
North Grosvenor Dale	74	20	46.2	2.72	
Norwalk	75	20	47.6	6.32	
Southington	74	20	46.8	4.40	3.0
South Manchester				3.18	
Storrs	73	17	46.1	4.40	
Voluntown	74	19	46.1	4.95	
Wallingford	72	24	46.8	3.95	T.
Waterbury	75	21	48.8	4.30	2.0
West Cornwall	75	19	44.0	3.67	10.0
West Simsbury				3.84	4.0
Delaware.					
Delaware City				2.91	
Milford	89	27	55.7	1.85	
Millsboro	87	26	55.2	1.39	
Newark	83	27	53.5	4.18	
Seaford	84	27	53.0	1.44	
District of Columbia.					
West Washington	88	26	55.4	3.70	
Florida.					
Apalachicola	85	42	67.4	0.00	
Archer	96	37	69.0	0.52	
Avon Park	94	46	71.6	0.98	
Bartow	94	43	71.6	2.62	
Bonifay	95	34	67.6	0.25	
Brooksville	97	42	69.8	1.91	
Caxambas	94	50	74.0	0.23	
Clermont	96	42	72.8	0.50	
De Funiak	93	31	66.6	0.45	
Deland	91	41	69.8		
Eustis	92	42	69.6	1.21	
Federal Point	90	43	68.6	3.34	
Fernandino	89	44	68.9	0.96	
Flamingo	87	55	74.4	T.	
Fort Meade	95	41	71.7	1.46	
Fort Myers	91	51	72.6	0.21	
Fort Pierce	87	45	70.8	2.07	
Gainesville	95	38	69.8	0.56	
Grasmere	92	45	70.8		
Huntington	93	40	69.7	2.11	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hypoluxo	82	49	72.5	4.19	
Inverness	91	43	69.2	3.79	
Jasper	94	38	67.0	0.00	
Johnstown	93	39	67.8	0.35	
Kissimmee	90	43	71.2	1.48	
Lake City	95	37	68.7	1.70	
Macclenny	94	38	67.3	0.13	
Madison	......	40	......	0.00	
Malabar	91	42	72.2	0.73	
Manatee	90	46	70.4	0.66	
Marianna	97	34	68.8	0.55	
Merritt Island	87	48	71.9	0.23	
Miami	85	51	73.9	2.33	
Middleburg				1.26	
Molino	91	35	65.6	0.73	
Monticello				T.	
Mount Pleasant				2.12	
New Smyrna	98	47	71.2	2.23	
Nocatee	94	44	71.7	0.89	
Ocala	95	39	70.2	2.33	
Orange City	98	39	70.8	2.27	
Orange Home	95	39	70.0	2.31	
Orlando	96	42	71.4	1.27	
Plant City	96	41	72.0	1.70	
Rockwell	89[b]	44[b]	69.0[b]	1.91	
St. Andrews	86	40	65.6	0.45	
St. Augustine	88	43	67.9	2.02	
St. Leo	95	44	70.6	0.74	
Stephenville	91	38	67.2	1.00	
Switzerland	91	40	68.2	0.86	
Tallahassee	91	39	67.8	0.15	
Tarpon Springs	90	44	68.9	0.54	
Titusville	89	40	70.2	1.57	
Wausau				0.89	
Georgia.					
Abbeville				1.28	
Adairsville	86[c]	31[c]	61.8[c]	1.88	
Albany	98	38	69.0	0.84	
Allapaha	95	32	66.9	0.82	
Americus	93	36	65.2	1.26	
Athens	82	36	61.4	2.79	
Bainbridge	97	33	68.0	1.20	
Blakely	97	33	68.0	0.60	
Bowersville	87	37	62.2	1.75	
Brunswick	94	41	70.8	0.53	
Butler	......	......	......	0.49	
Camak	......	34	64.6[i]	1.06	
Canton	......	......	......	2.00	
Carlton	......	......	......	2.25	
Clayton	85	25	58.6	3.01	
Columbus	95	36	67.5	0.75	
Cordele	95	32	65.8	1.04	
Covington	......	......	......	1.28	
Cuthbert	89	39	67.0	1.27	
Dahlonega	85	32	60.6	1.57	
Dawson	98	38	70.5	0.98	
Diamond	86	30	62.6[d]	......	
Dublin	......	......	......	0.50	
Dudley	94	37	66.4	0.50	
Eastman	97	39	68.4	1.20	
Eatonton	93	34	64.8	0.83	
Elberton	86	36	64.0	3.18	
Experiment	91	36	65.0	0.34	
Fitzgerald	95	34	67.2	0.82	
Fleming	97	34	66.8	0.70	
Forsyth	96	36	65.9	1.17	
Fort Gaines	91	35	65.5	0.84	
Gainesville	86	34	61.8	1.07	
Gillsville	87	32	63.0	1.99	
Glenville	94	39	67.4	1.35	
Greenbush	88	34	62.2	1.15	
Greensboro	90	32	63.6	1.10	
Griffin	89	34	66.0	0.48	
Harrison	92	33	64.6	0.34	
Lost Mountain	90	34	64.9	0.94	
Louisville	90	37	66.4	1.12	
Lumpkin	93	41	65.8	0.68	
Marshallville	93	35	65.8	1.15	
Mauzy	98	38	68.2	1.85	
Milledgeville	92	33	64.8	1.12	
Millen	92	35	65.2	1.37	
Montezuma	......	......	......	1.10	
Monticello	93	36	66.1	1.42	
Morgan	92	34	65.5	0.59	
Newnan	94	36	64.7	0.71	
Oakdale	......	......	......	0.88	
Oxford	87	35[f]	63.6[d]	0.90	
Point Peter	86	32	61.6	2.77	
Poulan	95	34	65.6	1.30	
Putnam	97	35	66.0	0.90	
Quitman	94	35	67.8	0.30	
Ramsey	85	29	62.0	2.18	
Resaca	......	......	......	2.25	
Rome	90	33	63.0	2.02	
St. George	95	37	67.9	0.12	
St. Marys	95	39	68.6	0.80	
Screven	93	39	67.7	1.15	
Statesboro	94	37	66.2	0.48	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Georgia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Talbotton	91	36	64.9	0.75	
Tallapoosa	91	35	64.2	0.97	
Toccoa	84	33	61.2	1.89	
Valdosta	92	35	66.7	0.35	
Valona	90	34	66.8	0.57	
Washington	89	35	63.8	1.52	
Waycross	96	41	69.0	0.01	
Waynesboro	89	37	66.4	0.50	
Westpoint	94	34	65.0	0.66	
Woodbury	88	31	62.6	0.95	
Idaho.					
American Falls	81	23	47.0	1.51	
Blackfoot	79	22	44.8	1.32	
Caldwell	90	25	53.2	1.04	5.0
Cambridge	89[e]	28[e]	52.6[e]	0.99	
Chesterfield	73	8	40.5	1.44	T.
Dent	92	28	53.0	0.76	
Dewey	70	28	45.5	1.50	15.0
Ellerslie	85	25	50.2	0.82	1.0
Fernwood	71	21	44.2	1.00	2.0
Forney	85	6	41.5	0.48	1.5
Garnett	88	27	56.2	0.55	
Grangeville	82	28	48.5	2.57	8.2
Hope	......	......	......	0.35	
Hot Springs	88	26	55.7	0.89	
Idaho Falls	78	22	45.2	1.10	
Kellogg	87	24	47.8	0.90	
Lake	66	4	34.9	1.05	8.0
Lakeview	81	28	49.5	1.10	
Landore	71	18	40.2	1.86	7.8
Lardo	72	13	39.2	1.04	2.5
Lost River	75	14	41.9	0.47	1.0
Lovell	77	20	45.3	0.63	
Meadows	84	18	45.8	0.85	
Milner	89	23	47.5	0.77	
Minidoka	82	21	48.2	1.07	2.0
Moscow	86	27	51.0	0.35	
Mountain Home	87	23	50.8	0.37	T.
Murray	85	22	46.8	1.11	T.
Nevens Ranch	......	......	......	1.75	
Oakley	79	22	47.2	1.23	5.0
Ola	87	25	50.4	1.35	
Orofino	96	25	54.1	0.75	
Paris	71	10	36.8	1.03	1.0
Pearl	......	......	......	1.49	6.0
Pollock	88	31	53.5	0.36	
Poplars	......	......	......	0.82	......
Porthill	81	26	49.2	0.97	
Roosevelt	64	10	34.7	1.21	10.0
St. Maries	88	26	49.9	1.00	T.
Salem	......	......	......	1.96	
Salmon	80	20	46.4	0.70	
Soldier	68	0	36.8	0.48	3.5
Standrod	......	......	......	1.48	7.5
Twin Falls	85	22	48.8	0.24	T.
Vernon	76	12	43.0	1.83	T.
Westlake	......	......	......	2.11	
Weston	79	21	47.2	1.91	3.0
Illinois.					
Albion	87	31	58.7	1.61	
Aledo	80	24	53.4	2.40	
Alexander	87	25	56.6	2.22	T.
Antioch	83	20	49.0	1.95	T.
Ashton	79	25	51.1	1.81	
Astoria	81	25	54.4	3.21	
Aurora	81	24	50.8	1.57	
Beardstown	......	......	......	2.30	
Benton	88	21	62.2	0.70	
Bloomington	85	24	56.2	2.83	
Bushnell	84	25	55.8	2.95	
Cambridge	84	27	54.4	2.07	
Carlinville	88	24	58.0	2.60	
Carlyle	......	......	......	1.71	
Carrollton	88	30	58.6	3.55	
Charleston	87	30	57.1	1.32	
Chester	92	40	62.4	3.04	
Cisne	88	30	59.2	2.28	
Coatsburg	86	24	56.8	2.95	
Cobden	87	29	60.8	1.17	
Colchester	82	26	56.0	2.73	
Decatur	88	27	55.9	3.02	
Dixon	83	23	51.2	2.70	
Dwight	83	24	52.9	2.06	
Equality	93	28	61.2	2.16	
Flora	85	26	56.6	1.22	
Friendgrove	85	28	57.6	1.64	
Galva	83	27	52.6	1.92	
Grafton	......	......	......	2.34	
Greenville	86	28	58.4	2.72	
Griggsville	85	22	59.1	2.71	
Halfway	89	29	60.4	1.52	
Havana	86	25	58.2	3.26	
Henry	83	22	55.0	1.65	
Hillsboro	85	27	57.2	2.08	
Hoopeston	85	25	53.4	1.84	
Joliet	84	25	52.5	1.67	
Kishwaukee	82	21	50.8	1.47	T.
Knoxville	81	28	53.8	2.52	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lagrange	82	22	50.8	1.59	
Laharpe	82	25	54.9	1.70	
Lanark	82	22	50.5	2.17	T.
Lincoln	84	31	56.8	2.45	
Loami	......	......	......	2.03	
McLeansboro	86	30	58.8	1.46	
Martinsville	89	28	57.6	2.40	
Martinton	86	23	51.5	2.03	
Mascoutah	88	29	57.4	2.00	
Minonk	83	23	54.4	0.92	
Monmouth	82	23	54.6	2.28	
Morrison	81	23	52.2	3.03	
Morrisonville	83	32[e]	56.4	2.41	
Mount Carmel	......	......	......	2.16	
Mount Vernon	89	26	59.4	1.58	
New Burnside	88	24	59.8	1.32	T.
Olney	88	27	57.9	1.93	
Ottawa	83	25	54.4	1.63	
Palestine	87	28	57.8	1.32	
Pana	83	26	57.0	3.94	
Paris	79	26	55.1	1.57	
Philo	86	25	53.6	1.65	
Plumhill	86	28	58.6	2.00	
Pontiac	82	27	54.8	2.18	
Rantoul	86	25	53.4	2.23	
Raum	90	28	60.4	1.90	
Riley	81	25	49.9	1.20	
Robinson	85	25	56.4	1.74	
Rockford	80	27	52.8	1.49	
Rushville	82	27	56.8	3.30	
St. Charles	84	25	51.0	1.67	
St. John	87	34	59.7	1.33	
Shobonier	86	27	57.8	2.25	
Streator	83	24	53.5	1.40	
Sullivan	87	28	56.6	2.72	
Sycamore	83	24	50.2	1.80	
Tilden	87	29	59.7	1.77	
Tiskilwa	84	26	53.4	2.42	T.
Tuscola	86	23	54.8	1.85	
Urbana	84	26	54.1	2.23	
Walnut	83	25	54.1	2.07	
Warsaw	......	......	......	2.58	
Windsor	84	27	55.7	2.23	
Winnebago	81	25	51.0	2.09	T.
Yorkville	84	23	51.9	1.97	
Zion	81	24	50.6	2.14	
Indiana.					
Anderson	89	26	54.1	2.00	
Angola	86	21	50.5	2.60	
Auburn	85	20	49.4	2.40	
Bedford	85	29	57.7	0.23	
Bloomington	84	30	56.4	2.15	
Bluffton	84	20	52.4	2.43	
Butlerville	84	26	56.6	2.58	
Cambridge City	82	24	51.8	2.96	
Columbus	86	25	55.7	1.71	
Connersville	86	25	54.2	2.88	
Crawfordsville	84	19	54.2	2.92	
Delphi	85	22	52.3	2.04	
Elkhart	84	25	51.0	1.97	
Farmersburg	86	27	56.2	1.79	
Farmland	81	25	52.1	2.41	
Fort Wayne	84	23	53.0	2.94	
Greencastle	83	27	65.3	2.86	
Greenfield	83	27	55.4	2.60	
Greensburg	85	25	56.1	1.76	
Hammond	78	25	51.8	1.70	
Holland	90	26	60.3	1.98	
Huntington	80	25	52.1	2.57	
Jeffersonville	86	28	58.0	1.93	
Knox	82	22	52.0	2.69	
Kokomo	82	23	52.6	2.89	
Lafayette	84	27	53.2	1.82	
Laporte	84	22	49.2	1.75	
Lima	81	21	50.0	2.89	
Logansport	81	22	51.8	2.16	
Madison	88	26	57.8	1.56	
Marengo	85	25	55.5	2.20	
Marion	85	23	53.7	3.07	
Markle	83	21	51.2	2.95	T.
Mauzy	83	24	53.4[d]	1.82	
Moores Hill	84	24	55.8	1.67	
Mount Vernon	91	29	60.2	2.42	
Northfield	82	23	51.2	2.29	
Paoli	86	27	57.6	1.59	
Plymouth	84	20	51.0	2.30	
Princeton	85	30	58.7	1.85	
Rensselaer	85	22	52.6	1.85	
Richmond	84	24	52.6	1.69	
Rochester	......	......	......	2.49	
Rockville	82	25	55.4	2.03	
Rome	87	26	59.2	2.28	
Salem	86	27	57.5	1.19	
Scottsburg	88	28	58.2	2.15	
Seymour	85	21	55.6	2.48	
Shelbyville	84	30	55.4	2.12	
South Bend	84	23	49.8	2.08	
Syracuse	86	20	51.8	3.26	

Table II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Terre Haute	85	30	58.2	3.66	
Valparaiso	82	23	51.9	2.09	
Veedersburg	83[d]	28[d]	55.6[d]	1.40	
Vevay	85	28	56.8	0.55	
Vincennes	89	29	58.3	1.74	
Washington	86	29	57.2	0.97	
Indian Territory.					
Ardmore	89	36	62.0	4.41	
Calvin	.....	.....	.....	5.00	
Durant	85	40	62.0	4.22	
Fairland	87	37	62.8	2.77	
Fort Gibson	.....	.....	.....	3.32	
Hartshorne	84	36	61.4	3.86	
Healdton	90	36	62.2	6.06	
Marlow	86	37	61.8	6.12	
Muskogee	86	40	63.4	5.23	
Okmulgee	90	35	65.0	3.24	
Pauls Valley	88	34	61.0	4.80	
Ravia	87	40	63.6	4.66	
Roff	87	38	62.6	4.23	
South McAlister	.....	.....	.....	5.86	
Tulsa	89	38	63.7	3.60	
Vinita	88	34	62.0	2.31	
Wagoner	88	38	64.2	4.43	
Webbers Falls	89	35	63.2	4.04	
Iowa.					
Afton	87	27	54.3	4.25	
Albia	85	26	53.0	1.87	
Algona	85	25	50.6	2.08	2.0
Allerton	79	28	54.0	2.93	
Alta	90	27	50.2	2.47	3.0
Alton	89	26	51.0	2.09	T.
Amana	82	26	52.9	1.98	
Ames	86	25	52.7	3.16	
Atlantic	89	24	53.1	4.34	
Audubon	90	28	52.8	2.96	
Baxter	86	25	53.4	2.60	T.
Bedford	76	27	51.2	3.59	
Belleplaine	83	26	51.4	2.07	
Bonaparte	85	25	54.7	2.40	
Boone	86	27	51.4	3.32	T.
Britt	86	27	50.3	3.13	2.0
Buckingham	.....	.....	.....	1.50	T.
Burlington	83	28	54.6	2.63	
Carroll	90	26	51.6	2.01	T.
Cedar Rapids	84	25	52.7	1.15	T.
Chariton	84	27	53.3	2.78	
Clarinda	90	27	54.0	2.82	
Clearlake	85	26	50.8	0.85	2.0
Clinton	85	22	53.0	2.22	
College Springs	87	29	55.1	2.53	
Columbus Junction	81	26	54.6	1.64	
Corning	86	26	53.4	3.49	
Corydon	85	27	55.0	1.88	
Creston	86	27	52.0	3.36	
Cumberland	.....	.....	.....	2.40	
Decorah	82	27	51.2	0.97	2.0
Delaware	77	25	50.2	1.54	1.0
Denison	90	24	52.6	2.89	0.5
Desoto	86	28	53.8	3.01	
Dows	86	26	50.4	2.38	0.5
Earlham	85	23	52.6	3.37	
Elkader	83	23	52.3	1.65	2.0
Elliott	90	27	56.2	2.16	
Estherville	89[e]	25	49.0[b]	0.71	
Fayette	80	21	49.6	3.63	1.8
Forest City	84	28	49.6	1.59	1.0
Fort Dodge	89	27	50.4	2.40	0.5
Fort Madison	.....	.....	.....	2.11	
Galva	.....	.....	.....	2.24	
Gilman	.....	.....	.....	2.38	
Glenwood	90	30	54.8	5.55	
Grand Meadow	81	25	50.2	0.93	1.5
Greenfield	88	26	54.6	3.16	
Grinnell (near)	84	25	52.6	2.16	T.
Grundy Center	81	25	51.6	2.04	1.0
Guthrie Center	88	26	53.6	3.18	
Hampton	81	25	51.8	3.65	1.2
Hancock	89	29	52.0	2.49	
Hanlontown	82	26	49.0	1.60	1.8
Harlan	89	26	52.6	3.45	T.
Hopeville	86	29	53.8	2.88	
Humboldt	78	28	51.2	2.72	
Idagrove	94	25	52.2	2.20	
Independence	78	24	51.1	0.53	2.0
Indianola	87	28	55.2	2.59	
Inwood	89	23	50.7	1.28	
Iowa City	83	23	51.2	1.83	
Iowa Falls	84	25	49.6	2.24	T.
Jefferson	87	28	53.3	2.42	.....
Keosauqua	86	23	54.2	2.22	
Knoxville	86	26	55.1	2.74	
Lacona	.....	.....	.....	3.04	
Larrabee	90	24	52.0	2.58	2.0
Leclaire	.....	.....	.....	2.14	T.
Lemars	90	25	51.4	2.49	T.
Lenox	86	28	53.6	3.07	
Leon	84	29	54.8	3.04	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Little Sioux	92	26	55.2	3.06	
Logan	92	27	54.0	2.44	
Maple Valley	.....	.....	.....	2.51	2.0
Marshalltown	87	25	51.5	2.18	
Mason City	80	27	50.4	1.90	3.0
Massena	89	26	55.0	2.41	
Mountayr	86	28	54.5	4.13	
Mount Pleasant	83	23	54.1	2.81	
Mount Vernon	84	25	53.2	1.92	1.0
Muscatine	.....	.....	.....	1.75	
Nevada	.....	.....	.....	2.57	T.
New Hampton	78	25	50.6	1.20	.....
Northwood	77	25	49.8	1.79	2.0
Odebolt	91	22	52.8	3.10	
Ogden	86	28	53.0	2.81	
Olin	79	25	51.1	1.23	T.
Onawa	94	26	54.6	3.47	0.1
Osage	77	27	50.2	1.65	0.3
Oskaloosa	86	26	54.2	1.63	
Ottumwa	88	28	55.4	2.40	
Pacific Junction	90	27	55.3	2.27	
Pella	88	26	55.5	2.58	T.
Perry	89	27	53.0	3.38	0.3
Plover	89	26	51.4	2.59	2.0
Pocahontas	89	28	51.3	2.61	1.8
Redoak	89	31	56.8	3.06	
Ridgeway	82	27	51.8	1.56	.....
Rock Rapids	82	26	49.9	2.05	
Sac City	89	26	51.8	2.75	
St. Charles	86	28	54.9	2.49	
Sheldon	92	24	51.4	4.16	T.
Sibley	90	25	48.4	2.81	
Sigourney	86	25	55.0	1.48	
Sioux Center	88	26	50.0	1.79	T.
Stockport	85	24	54.8	2.17	
Storm Lake	87	27	49.2	2.09	3.0
Stuart	78	26	52.4	2.62	
Thurman	90	28	55.6	2.60	
Tipton	80	29	54.0	1.21	
Toledo	86	26	53.2	2.35	
Vinton	82	26	52.2	.....	
Wapello	81	28	55.4	1.56	
Washington	84	26	52.2	1.51	
Washta	91	25	50.2	4.13	
Waterloo	83	26	51.3	1.55	0.8
Waukee	86	27	53.8	4.07	
Waverly	82	28	51.3	1.70	1.0
Webster City	87	22	52.5	3.27	0.5
Westbend	86	25	50.8	1.66	2.0
Whitten	79	24	51.4	3.06	T.
Wilton Junction	83	30	54.4	2.04	
Winterset	87	27	54.5	3.36	
Woodburn	83	24	53.2	3.14	
Zearing	85	23	51.8	2.82	0.5
Kansas.					
Abilene	.....	.....	.....	2.24	
Alton	93	29	57.0	2.41	
Anthony	.....	.....	.....	3.34	
Atchison	88	33	58.6	3.27	
Baker	88	32	56.2	3.63	
Beloit	.....	.....	.....	3.53	
Blue Rapids	.....	.....	.....	2.53	
Burlington	88	34	61.1	2.85	
Chapman	79	30	54.8	1.97	
Cimarron	89	29	57.0	2.24	T.
Clay Center	90	29	57.7	2.92	
Colby	94	26	54.7	4.90	2.5
Columbus	85	35	61.2	2.46	
Coolidge	84	25	53.6	3.39	5.0
Cottonwood Falls	88	30	59.3	3.78	
Cunningham	90	32	58.7	3.32	
Dresden	91	27	55.4	3.68	1.0
Eldorado	86	33	58.6	3.81	
Ellinwood	90	33	60.1	1.87	
Ellsworth	92	31	58.2	2.55	
Emporia	87	34	59.3	4.85	
Englewood	93	32	61.7	1.47	
Enterprise	91	30	58.8	1.82	
Eureka	.....	.....	.....	3.63	
Fall River	88	35	61.6	2.25	
Farnsworth	94	28	56.2	4.01	T.
Forsha	88	35	59.1	3.65	
Fort Scott	88	33	61.1	1.67	
Frankfort	91	28	57.2	3.42	
Fredonia	87	31	61.9	2.24	
Garden City	93	28	56.9	3.24	
Garnett	90	33	61.8	1.89	
Gove*[1]	90	29	54.9	3.29	
Grenola	87	34	60.2	3.02	
Harrison	90	28	55.9	5.14	
Hays	93	30	56.6	1.67	
Horton	87	30	56.6	4.04	
Hoxie	92	24	55.2	4.06	
Hugoton	86	29	56.2	2.78	
Hutchinson	89	33	58.5	3.49	
Independence	90	36	63.6	1.99	
Jetmore	.....	30	.....	2.19	
La Crosse	93	31	57.8	1.50	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lakin	90	26	55.6	3.08	
Larned	86	27	56.4	2.25	
Lebanon	89	.....	.....	3.40	
Lebo	89	33	60.0	2.48	
Macksville	89	23	57.3	2.24	
McPherson	90	32	58.6	2.96	
Madison	90	34[m]	58.6[g]	3.01	
Manhattan *b*	92	29	59.6	2.26	
Manhattan *c*	90	29	57.8	2.36	
Marion	88[f]	32[f]	58.4[f]	3.75	
Medicine Lodge	91	35	60.0	3.22	
Minneapolis	90	32	57.2	2.46	
Moran	87	32	61.4	1.42	
Mounthope	.....	.....	.....	3.25	
Neosho Rapids	.....	.....	.....	2.50	
Norton	92	29	57.9	5.18	T.
Norwich	87	36	60.4	2.94	
Oberlin	.....	.....	.....	3.48	2.0
Olathe	84	31	59.8	2.82	
Osage City	88	31	58.6	3.18	
Oswego	86	35	61.6	1.89	
Ottawa	89	30	59.8	2.42	
Pittsburg	89	35	62.7	2.54	
Plainville	91[e]	30	55.7[e]	3.52	T.
Pleasanton	85	32	60.8	1.69	
Pratt	89	30	59.6	2.48	
Republic	91	28	55.8	4.15	
Rome	89	35	61.0	6.59	
Russell	93	33	56.4	2.03	
Salina	92	29	58.6	1.82	
Scott	92	31	56.4	3.35	
Sedan	.....	.....	.....	1.98	
Toronto	93	33	58.0	2.05	
Valley Falls	90	33	58.4	1.89	
Wakeeney	91	30	56.5	3.57	
Wakeeney (near)	.....	.....	.....	3.77	
Wallace	90	22	53.0	4.27	1.8
Walnut	86	35	62.2	1.84	
Wamego*[1]	87	38	59.6	3.40	
Winfield	88	38	62.4	6.70	
Yates Center	92	33	62.2	.....	
Kentucky.					
Alpha	88	30	61.6	1.90	
Anchorage	87	26	56.8	1.67	
Bardstown	91	27	59.4	1.25	
Beattyville	89	24	57.0	1.92	
Beaver Dam	89	27	59.0	1.47	
Berea	87	27	59.8	1.41	
Blandville	84	31	60.2	1.48	
Bowling Green	94	27	62.0	1.12	
Burnside	91	28	59.6	1.26	
Cadiz	91	28	61.9	1.20	
Calhoun	90	29	61.8	1.06	
Catlettsburg	89	27	58.6	1.50	
Earlington	89	26	61.7	1.26	
Edmonton	87	27	55.5	1.11	
Eubank	86	26	57.0	1.35	
Falmouth	.....	.....	.....	0.92	
Farmers	88	23	57.2	1.53	
Frankfort	85	29	57.4	1.15	
Franklin	88	28	60.8	1.47	
Greensburg	90	25	58.2	1.72	
High Bridge	94	30	59.6	0.53	
Hopkinsville	90	26	60.0	1.27	
Irvington	87	29	59.6	1.63	
Jackson	91	27	60.5	2.08	
Leitchfield	86	28	58.8	1.61	
Loretto	89	24	60.0	1.32	
Lynnville	89	28	61.8	1.64	
Manchester	90	24	58.8	1.81	
Marion	87	29	61.2	1.05	
Maysville	92	28	57.0	0.83	
Middlesboro	88	26	58.7	2.23	
Mount Sterling	86	28	57.6	1.32	
Owensboro	87	30	60.0	1.86	
Owenton	85	32	57.0	1.43	
Paducah	91	34	63.6	1.28	
Princeton	90	30	62.7	0.77	
Richmond	88	28	59.5	1.08	
St. John	86	27	56.0	.....	
Scott	86	26	57.0	1.20	
Shelby City	89	25	57.6	1.94	
Shelbyville	87	27	56.8	1.46	
Taylorsville	86	27	57.2	1.04	
Williamsburg	90	27	59.6	1.19	
Williamstown	86	25	56.4	1.24	
Louisiana.					
Abbeville	90	38	69.4	2.51	
Alexandria	93	38	69.9	3.39	
Amite	87	35	66.8	4.17	
Baton Rouge	88	38	67.8	3.00	
Burnside	88	38	67.8	2.26	
Calhoun	91	32	65.2	1.86	
Cameron	82	45	69.6	3.98	
Cheneyville	86	41	67.6	5.28	
Clinton	85	34	66.4	4.11	
Collinston	89	42	68.2	2.20	
Covington	88	40	67.0	1.76	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Louisiana—Cont'd.	°	°	°	Ins.	Ins.
Donaldsonville	92	37	69.6	2.40	
Farmerville	88	35	67.6	2.65	
Franklin	91	38	69.3	3.79	
Georgetown	87	35	66.3	7.08	
Grand Coteau	87	38	68.8	4.80	
Hammond	86	37	66.8	2.38	
Houma	87	35	68.2	3.32	
Jennings	86	40	68.9	3.75	
Lafayette	86	37	68.6	4.08	
Lake Charles	90	41	70.5	3.05	
Lakeside	85	46	69.8	3.20	
Lawrence	87	42	67.8	1.04	
Libertyhill	90	34	66.4	1.91	
Logansport	.....	.....	.....	1.87	
Melville	88	35	68.2	3.96	
Minden	83	37	64.2	2.60	
Monroe	90	35	67.9	1.28	
Morgan City	.....	..	.....	2.54	
New Iberia	84	42	68.8	2.50	
Opelousas	88	37	68.2	5.11	
Oxford	89	45	68.2	2.04	
Plain Dealing	89	38	66.0	2.42	
Rayne	88	38	69.2	3.25	
Reserve	93	44	70.2	1.56	
Robeline	87	37	66.2	3.03	
Ruston	90	36	67.8	2.40	
St. Francisville	89	38	67.9	3.10	
Schriever	91	36	68.9	0.83	
Simmesport	.....	.....	.....	3.54	
Southern University	.....	..	.....	2.00	
Sugar Experiment Station	87	43	68.6	1.95	
Sugartown	84	38	67.4	5.34	
Maine.					
Bar Harbor	64	20	39.8	4.33	15.0
Chesuncook	51	4	33.1	2.33	14.0
Cornish	72	19	42.4	1.91	9.5
Danforth	.....	.....	.....	4.88	
Debsconeag	68	16	42.0	3.69	14.0
Farmington	68	12	40.6	2.06	12.0
Fort Fairfield	58	2	35.4	2.54	1.0
Gardiner	67	14	40.6	3.74	21.0
Grant Farm	.....	.....	.....	3.33	
Greenville	57	— 3	35.4	2.20	16.0
Houlton	60	5	36.7	3.20	4.0
Lewiston	68	20	41.8	2.93	14.0
Madison	62	15	39.8	4.27	6.5
Mayfield	58	15	38.0	2.70	12.0
Millinocket	64	6	35.8	3.69	10.5
North Bridgton	68	17	41.8	2.36	T.
Oquossoc	60	— 1	35.7	2.17	14.0
Orono	64	14	40.0	3.65	11.5
Patten	60	3	36.2	2.40	4.0
Rumford Falls	66	20	40.2	1.69	9.0
The Forks	.....	.....	.....	2.18	
Thomaston	62	18	40.6	3.64	11.0
Vanburen	65	— 7	34.6	1.60	6.0
Winslow	68	17	40.6	2.78	11.0
Maryland.					
Annapolis	85	28	57.0	2.81	T.
Bachmans Valley	83	24	53.4	5.13	
Cambridge	90	30	56.2	2.27	T.
Cheltenham	87	25	54.9	2.80	
Chestertown	81	27	53.5	2.66	T.
Chewsville	83	21	52.0	1.94	
Clearspring	88	24	53.2	3.33	
Coleman	84	29	55.0	3.26	
Collegepark	96	21	54.7	3.44	
Darlington	87	27	53.5	4.31	
Deerpark	77	10	47.0	4.37	
Denton	..	.....	.....	2.19	
Easton	83	29	54.6	2.49	
Fallston	84	25	53.3	4.92	
Frederick	87	26	56.0	4.39	T.
Frostburg	.....	.....	.....	2.81	T.
Grantsville	74	15	46.8	2.95	2.0
Great Falls	87	23	54.3	3.91	
Greenspring Furnace	84	24	54.6	2.48	
Harney	.....	.....	.....	5.32	
Jewell	89	27	55.5	2.11	
Johns Hopkins Hospital	.....	.....	.....	3.53	
Keedysville	87	14	54.4	3.64	
Lake Montebello	86	26	53.9	3.91	T.
Laurel	89	27	55.6	3.35	
McDonogh	85	26	54.1	5.37	
Mount St. Marys College	80	28	55.6	3.20	
New Market	85	26	54.7	3.99	T.
Oakland	76	16	47.7	4.17	1.5
Pocomoke City	84	20	55.8	1.67	
Porto Bello	86	28	54.9	2.12	
Prince Fredericktown	91	26	55.4	2.25	T.
Princess Anne	83	26	54.4	2.30	
Solomons	87	30	55.4	1.34	
Sudlersville	90[d]	27[d]	55.8[d]	2.51	
Takoma Park	88	25	56.0	3.38	
Taneytown	85	23	52.6	4.18	
Van Bibber	85	28	54.0	3.68	
Westernport	83	24	52.7	0.38	
Woodstock	86	28	55.4	4.67	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Massachusetts.	°	°	°	Ins.	Ins.
Amherst	74	21	46.0	3.25	2.0
Bedford	75	23	46.6	2.92	
Bluehill (summit)	73	22	45.6	2.50	1.0
Cambridge	71	26	47.7	2.32	
Chestnuthill	74	26	47.0	2.62	
Concord	75	22	45.4	2.79	2.0
East Templeton *[1]	73	24	43.3	1.00	2.0
Fallriver	69	26	46.8	2.99	
Fitchburg	75	24	46.0	2.38	5.0
Framingham	75	21	46.0	2.72	
Groton	74	21	44.1	2.96	4.0
Hyannis	.....	.....	.....	2.28	
Jefferson	.....	.....	.....	3.56	3.0
Lawrence	76	23	45.6	2.97	2.5
Leominster	.....	.....	.....	2.69	3.7
Lowell	72	23	46.9	3.00	
Ludlow Center	70	14	41.2	2.91	1.0
Middleboro	74	19	45.2	2.03	
Monson	74	17	45.6	2.87	3.0
New Bedford	71	27	47.2	2.51	
Pittsfield	.....	.....	.....	3.55	5.0
Plymouth	68	25	44.3	2.39	
Princeton	.....	.....	.....	3.26	3.5
Provincetown	60	26	44.2	1.56	
Salem	.....	.....	.....	2.75	2.0
Somerset *[1]	75	20	47.6	2.61	
Sterling	.....	.....	.....	2.63	3.5
Taunton	66	18	44.8	2.33	
Westboro	77	22	47.7	2.79	1.0
Weston	74	20	45.0	2.59	0.5
Williamstown	70	20	43.6	2.93	2.0
Winchendon	.....	.....	.....	1.76	4.0
Worcester	74	25	47.0	2.22	2.3
Michigan.					
Adrian	82	19	50.7	2.78	
Agricultural College	.....	.....	.....	2.43	T.
Allegan	87	20	49.0	.....	
Alma	75	23	47.4	1.71	T.
Ann Arbor	76	24	49.3	2.19	T.
Arbela	75	22	47.6	2.36	1.5
Baldwin	.....	.....	.....	1.20	0.5
Ball Mountain	75	24	47.8	2.66	T.
Battlecreek	80	26	52.2	2.13	
Bay City	67	25	45.6	2.20	1.0
Benzonia	72[f]	23[f]	45.6[f]	1.83	T.
Berlin	74	23	47.0	1.83	1.5
Big Rapids	74	22	46.6	1.97	T.
Birmingham	75	26	49.0	1.91	
Bloomingdale	80	22	47.2	2.00	
Calumet	74	20	42.2	0.74	0.5
Carsonville	73	24	46.5	1.45	
Cassopolis	82	21	49.4	4.00	
Charlevoix	70	24[b]	44.6[b]	1.17	T.
Charlotte	79	21	48.8	1.41	
Chatham	69	13	40.4	0.83	1.0
Cheboygan	75	23	44.5	0.20	T.
Clinton	75	22	49.2	1.91	
Coldwater	80	21	50.9	2.24	
Concord	78	21	48.8	2.02	T.
Deer Park	65	20	39.5	0.98	
Dundee	78	22	49.8	1.80	
Eagle Harbor	72	21	41.7	0.89	.....
East Tawas	70[d]	24[d]	43.4[d]	2.38	.02
Eloise	78	28	49.2	1.25	T.
Flint	75	24	47.6	1.34	
Grand Marais	63	27	41.0	1.47	T.
Grape	75	23	48.4	1.97	
Grasslake	74	22	47.4	2.33	1.0
Grayling	75	22	44.0	1.98	8.0
Hagar	80	14	45.4	2.00	T.
Harrison	72	22	46.2	1.30	3.0
Harrisville	73	25	43.0	2.40	2.0
Hastings	79	19	48.8	2.03	T.
Hayes	74	25	45.6	2.80	2.0
Highland	.....	.....	.....	2.22	3.0
Hillsdale[h]	80	21	49.8	.....	.....
Holland	81	22	49.2	1.87	T.
Howell	73	28	48.1	1.46	0.5
Humboldt	68	4	39.6	0.95	2.0
Ionia	.....	.....	.....	2.24	.....
Iron Mountain	71	21	44.8	1.73	T.
Iron River	71	15	43.6	1.40	T.
Ironwood	76	23	45.6	0.92	0.2
Ishpeming	70	10	39.4	.....	1.0
Ivan	70	17	45.1	2.01	6.0
Jackson	79	23	50.6	2.23	
Jeddo	74	25	45.7	1.51	2.4
Kalamazoo	78	25	49.4	2.33	
Lansing	75	24	49.2	2.10	T.
Ludington	.....	.....	.....	2.80	
Mackinac Island	63	24	40.5	0.92	3.0
Mackinaw City	64	18	42.2	0.90	
Mancelona	76	19	44.2	.....	
Maple Ridge	70	16	42.1	1.22	
Menominee	72	26	43.9	1.46	T.
Mio	72	22	44.4	2.42	6.4
Montague	73	22	45.6	1.16	
Mount Clemens	78	22	47.2	1.27	T.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	Ins.	Ins.
Muskegon	76	21	45.4	1.47	T.
Newberry	.....	.....	.....	0.40	3.0
Old Mission	72	21	43.2	0.88	
Olivet	77	24	48.6	2.46	T.
Omer	74	24	45.2	2.45	3.0
Ovid	76	26	47.9	2.53	
Owosso	72	25	48.2	2.58	
Petoskey	73	25	43.6	0.70	
Plymouth	78	23	49.0	2.10	
Pontiac	75	25	47.6	1.34	T.
Port Austin	72	25	44.0	1.50	
Reed City	74	25	48.6	0.75	T.
Roscommon	68	18	44.6	.....	
Saginaw (W. S.)	75	25	48.2	2.51	T.
St. James	65	25	42.8	2.34	
St. Johns	77	23	49.1	2.18	T.
St. Joseph	75	26	47.9	2.40	0.5
Slocum	73	20	45.7	1.84	
Somerset	75	22	47.4	2.27	
South Haven	77	20	43.8	3.14	T.
Staunton	75	23	47.6	1.37	T.
Thomaston	76	16	44.0	.....	T.
Thornville	74	24	48.8	2.27	4.0
Traverse City	73	24	45.2	0.30	T.
Vassar	75	20	48.7	2.35	
Wasepi	80	22	48.4	3.24	
Webberville	74	22	49.0	2.38	1.0
West Branch	68	19	43.4	0.99	4.0
Wetmore	80	10	40.0	0.85	2.0
Whitefish Point	64	19	36.8	1.87	3.0
Woodlawn	71	14	41.6	2.01	6.0
Ypsilanti	77	19	48.4	1.82	T.
Minnesota.					
Albert Lea	77	28	50.1	1.52	T.
Alexandria	81	21	47.6	2.16	
Amboy	.....	.....	.....	1.46	
Angus	84	20	46.8	1.99	
Ashby	78	24	48.3	2.28	
Bagley	78	20	45.6	1.70	1.0
Beaulieu	82	22	42.0	2.00	2.0
Bemidji	79	20	46.6	1.45	
Bird Island	77	23	49.6	1.70	
Caledonia	81	24	50.4	1.15	1.5
Campbell	81	24	47.4	1.85	
Cass Lake	.....	.....	.	1.16	
Collegeville	77	25	49.0	1.47	0.6
Crookston	80	23	46.0	2.56	T
Detroit	81	19	45.6	1.94	.....
Fairmont	82	28	49.4	1.40	
Faribault	77	26	49.2	1.31	
Farmington	82	27	50.0	3.38	T.
Fergus Falls	82	26	49.4	2.13	1.2
Floodwood	77	19	45.4	1.44	
Glencoe	78	22	50.6	1.90	
Grand Meadow	78	26	47.6	1.69	0.5
Hallock	82	18	47.3	1.03	
Halstead	79	14	46.0	2.03	
Hinckley	77	20	47.0	2.14	
Hovland	65	17	39.9	0.82	T.
Leech	80	20	44.8	1.65	.....
Little Falls	79	26	47.1	1.60	
Long Prairie	80	25	49.0	1.47	T.
Luverne	87	26	49.3	1.24	.....
Lynd	88	25	49.0	1.84	
Mankato	.....	.....	.....	1.95	
Mapleplain	.....	.....	.....	1.82	0.2
Milaca	79	22	46.3	1.67	
Milan	80	25	49.2	2.48	
Montevideo	80	25	50.6	2.79	
Mora	78	23	47.5	1.83	
Morris	81	26	49.2	2.04	
Mount Iron	77	17	44.4	0.86	4.0
New London	78	24	48.0	1.18	
New Richland	75	29	50.9	1.73	
New Ulm	81	27	51.2	1.19	T.
Park Rapids	76	23	44.6	2.37	0.2
Pine River	74	18	47.1	1.64	.....
Pipestone	82	20	48.3	1.93	
Pokegama Falls	78	18	45.0	1.32	.....
Pratt	.....	.....	.....	1.67	.....
Redwing	81	26	51.7	2.10	
St. Charles	80	28	48.8	1.34	
St. Cloud	81	25	51.0	1.68	.....
St. Peter	.....	.....	.....	1.61	
Sandy Lake Dam	75	21	45.6	1.32	
Shakopee	81	25	52.2	2.15	
Stillwater	.....	.....	.....	2.90	
Tonka	.....	.....	.....	1.93	
Two Harbors	74	18	42.7	1.80	1.0
Wabasha	87	25	52.0	1.61	T.
Wadena	80	24	47.4	1.17	0.5
Winnebago	86	28	50.8	1.78	.....
Winnibigoshish	75	16	43.8	1.71	.....
Winona	80	24	49.1	1.16	T.
Worthington	82	25	47.6	0.22	
Zumbrota	87	25	50.0	0.86	T.
Mississippi.					
Aberdeen	91	36	65.5	2.47	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Mississippi—Cont'd.					
Austin	88	30	64.9	2.45	
Batesville	92	31	64.7	1.10	
Bay St. Louis	88	42	67.8	1.42	
Biloxi	88	43	69.2	1.09	
Booneville	84	35	64.0	1.67	
Brookhaven	90	40	66.8	2.20	
Canton	89	38	66.8	0.90	
Columbia				2.60	
Columbus	90	36	65.6	0.80	
Corinth	83	33	61.9	1.84	
Crystal Springs	89	40	66.6	1.64	
Duck Hill	89[c]	31[c]	63.4[c]	1.31	
Edwards	88	35	66.9	2.15	
Enterprise				0.98	
Fayette	84	31	65.8	2.48	
Fayette (near)				2.41	
Greenville [b]	91	31	65.8	1.35	
Greenwood	90	32	64.4	1.02	
Hattiesburg	93	38	66.6	1.03	
Hazlehurst	87	40	67.0	2.10	
Hernando	90	30	63.9	1.76	
Holly Springs	88[b]	32[b]	63.9[b]	1.07	
Jackson	89	39	66.4	1.77	
Kosciusko	89	34	65.2	1.72	
Lake	91	35	65.4	1.68	
Lake Como	88	36	66.0	1.72	
Laurel	93	42	67.8	0.78	
Leakesville	94	38	67.4	1.72	
Louisville	89	36	64.1	0.92	
McNeill	79	38	63.5	1.96	
Macon	90	37	66.3	0.60	
Magee	90	37	65.8	1.52	
Magnolia	89	38	67.3	4.65	
Merrill				2.42	
Natchez	90	32	67.6	2.36	
Nitta Yuma	90	43[d]	68.6[c]	1.45	
Okolona	88	39	64.0	1.98	
Patmos				3.15	
Pearlington				1.26	
Pecan	86	40	65.4	0.85	
Pittsboro	88	33	62.8	1.31	
Pontotoc	87	33	64.0	1.45	
Port Gibson	89	39	65.5	2.38	
Porterville	88	34	64.6	1.19	
Quitman	90	34	66.8	0.96	
Ripley	88	29	61.9	1.70	
Shelby	92	30	65.8	1.72	
Shoccoe	90	36	67.1	1.86	
Shubuta				0.77	
Stonington				3.23	
Suffolk	88	31	66.8	2.67	
Swan Lake	91	31	65.8	1.13	
Tchula	91	33	67.4	1.83	
Tupelo	89	35	64.2	1.08	
University	89	31	63.7	1.43	
Utica	87	35	65.4	2.30	
Walnutgrove	87[c]	36[c]	65.8[c]	2.13	
Watervalley	90	32	64.4	2.80	
Waynesboro				0.76	
Woodville	86	33	67.0	4.03	
Yazoo City	89	35	66.4	2.82	
Missouri.					
Albany				2.90	
Appleton City	86	31	60.0	1.93	
Arlington				1.75	
Arthur	86	31	61.0	1.40	
Avalon	86	29	56.6	2.85	
Belle	87	26	59.1	1.07	
Bethany	86	29	55.2	2.99	
Birchtree	87[c]	28[c]	62.7[c]	3.21	
Bolivar	85	30	60.6	3.38	
Boonville				1.46	
Brunswick	91	31	56.4	2.26	
Cape Girardeau				0.91	
Caruthersville	91	27	62.6	3.28	
Conception	87	31	55.8	3.67	
Darksville	86	31	57.4	1.66	
Dean	89	32	63.0	3.20	
De Soto	88	27	60.0	2.43	
Doniphan	86	26	61.6	1.63	
Eldorado Springs	87	32	61.8	1.54	
Fairport				2.88	
Fayette	84	27	56.6	1.94	
Fulton	91	28	59.8	2.58	
Gallatin *1	84	32	57.2	3.54	
Gano	85	24	61.2	2.66	
Glasgow				1.16	
Goodland	86	23	58.0	1.74	
Gorin				2.92	
Grant City	88	30	55.6	4.13	
Harrisonville	87	32	58.6	1.56	
Hazlehurst				2.48	
Hermann				1.70	
Houston	87	25	59.4	3.01	
Ironton	91	23	58.6	2.11	
Jackson	90	27	61.4	1.33	
Jefferson City	88	29	58.6	1.94	
Joplin	86	35	63.2	2.62	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Missouri—Cont'd.					
Kidder	86	31	55.7	2.44	
Koshkonong	86	29	62.1	2.10	
Lamar	86	34	61.6	2.63	
Lamonte				1.32	
Lebanon	87	30	60.2	2.41	
Lexington	85	31	60.0	1.05	
Liberty	86	32	58.8	1.76	
Lockwood	87[f]	31[f]	60.0[f]	2.62	
Louisiana	86	25	57.6	2.72	
Macon	88	28	58.0	2.50	
Marblehill	90	26	61.2	2.01	
Marshall	85	30	57.7	2.13	
Maryville	88	31	55.0	4.31	
Mexico	87	28	56.9	1.96	
Monroe	83	27	55.6	2.63	
Montgomery City	86	28	58.3	1.06	
Mountain Grove	84	30	59.8	2.88	
Neosho	87	31	61.4	2.63	
New Haven	88	38	61.4	2.33	
New Madrid				1.47	
New Palestine	86	33	59.8	1.56	
Oakfield	86	30	60.5	2.80	
Olden	87	23	61.6	4.18	
Oregon	87	30	57.2	3.10	
Osceola				1.83	
Princeton	89	32	57.0	2.84	
Rockport				4.11	
Rolla				2.11	
St. Charles	89	28	59.6	2.01	
St. Joseph				2.31	
Sarcoxie				2.69	
Sedalia	87	29	60.2	1.45	
Seymour	85	30	60.4	4.06	
Sikeston	88	28	60.6	1.74	
Steffenville	85	27	56.7	3.58	
Sublett	83	28	55.6	4.15	
Trenton	82	31	56.1	2.24	
Unionville	84	27	54.6	3.24	
Versailles	93	29	63.2	2.50	
Warrensburg	88	32	60.6	1.31	
Warrenton	87	28	58.4	2.08	
Warsaw	90	29	60.6	2.08	
Wheatland				2.20	
Willowsprings	85	22	57.7	3.66	
Windsor	86	29	59.8	2.28	
Zeitonia	88	22	58.1	1.84	
Montana.					
Absarokee				1.25	2.0
Adell	79	12	43.0	1.37	6.5
Anaconda	79	17	44.2	1.20	
Augusta	86	14	45.6	0.92	
Bear Creek				0.64	3.5
Billings	89	16	51.8	2.96	8.0
Boulder	78	20	45.9	0.08	1.0
Bozeman	75	12	42.4	1.61	4.4
Butte	76	6	43.0	1.70	
Canyon Ferry	84	19	47.6	0.72	
Cascade	86	20	50.8	1.16	T.
Chester	88	16	46.2	0.02	
Chinook	84	16	50.0	0.07	
Choteau	85	22	47.4	0.56	
Clear Creek	84	14	49.0	0.29	T.
Columbia Falls	84	18	45.8	0.38	
Copper				0.52	0.2
Crow Agency	84	6	49.4	1.40	6.0
Culbertson	87	−2	47.8	2.20	
Dayton	82	22	46.6	0.44	
Decker	85	6	46.8	1.02	
Deerlodge	78	13	42.6	0.59	
Dillon	76	16	46.8	0.77	0.5
Ekalaka	85	6	48.5	2.35	
Ericson				1.58	
Evans	82	21	47.6	2.90	16.0
Fallon	91	3	46.4	0.23	2.3
Forsyth	89	20	51.2	0.72	3.0
Fort Benton	90	20	50.4	0.85	
Fort Harrison	84	20	46.6		
Fort Logan	68	10	36.7	0.00	
Glasgow	87	21	49.0	1.92	
Glendive	91	13	53.2	2.13	4.0
Gold Butte				0.67	2.9
Graham	86	7	48.0	1.59	5.0
Grave Creek Cabin				0.58	
Grayling	63	−2	33.4	0.71	8.0
Greatfalls	82	25	49.0	1.17	
Hamilton	83	25	49.4	1.00	1.0
Highwood				1.89	9.0
Homepark				2.72	
Jordan	91	20	45.8	0.89	1.0
Lakeview				1.90	6.0
Lame Deer	86	−5	46.6	1.10	8.0
Lewistown	86	14	46.5	0.10	T.
Livingston	81	14	47.5	1.57	T.
Lodge Grass	85[d]	7[d]	48.2[d]	0.38	6.0
Malta	84	18	49.2	0.25	
Marion	86	16	43.4		
Marysville	82	22	47.1	1.92	6.0
Mullets Ranch				3.69	4.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Montana—Cont'd.					
Missoula	80	26	50.2	0.20	
Nye				1.48	3.7
Ovando	81	18	43.1	0.90	
Philipsburg	80	19	44.5	2.25	5.8
Plains	83	23	48.3	0.40	
Poplar	89	15	48.7	3.10	4.0
Raymond				0.25	2.0
Redlodge	75	9	42.2	1.72	2.9
Ridgelawn	88	8	49.0	1.75	1.0
St. Pauls	86	10	53.1	0.61	3.0
St. Peter	79	21	46.6	1.76	1.5
Saltese				0.48	
Springbrook	87	11	49.4	2.43	2.0
Steele	87	22	50.6	0.53	2.0
Tokna	93	10	49.4	1.21	1.0
Toston	84	18	48.6	0.15	
Townsend				0.54	
Troy	86	20	47.0	0.61	
Twin Bridges	81	15	47.1	1.00	
Utica	81	11	46.1	0.16	1.0
Virginia City	74	12	41.4	1.81	6.0
Warrick				0.15	T.
Whitlash	88	12	47.6	0.57	T.
Wolf Creek	81	21	46.2	1.16	0.3
Wolsey	76	3	38.5	0.66	3.0
Yale	84	12	45.0	0.07	
Nebraska					
Agate	84	10	45.1	1.66	2.0
Agee *1				4.30	
Ainsworth	86	21	50.6	4.00	2.5
Albion	77	25	51.6	5.12	
Alliance	86	21	49.4	3.70	
Alma	92	29	55.3	5.37	
Arapaho				4.93	
Arcadia				6.79	
Ashland	91	30	55.4	3.74	
Ashton				8.10	
Auburn	90	30	54.0	3.58	
Beatrice	89	28	56.0	1.90	
Beaver	94	28	55.9	5.51	
Bellevue	90	32	56.0	3.00	
Blair	93	29	55.2	3.77	
Bluehill				4.61	
Bradshaw				6.04	
Bridgeport	87	25	49.8	1.75	
Broken Bow	91	25	51.4	9.35	
Burchard				2.89	
Burge				1.79	4.0
Burwell				5.21	
Callaway	92	25	52.8	8.88	
Central City				10.13	
Chester				3.19	
Clearwater	90	24	52.0	4.23	T.
Cody				1.20	0.6
Columbus	88	27	52.6	3.96	
Crawford				1.31	
Crete	89	30	56.0	3.42	
Culbertson	92	22	56.8	3.48	1.0
David City	87	28	53.4	5.67	T.
Dawson	92	30	58.8	3.27	
Dubois				3.21	
Duff				7.30	
Dunning				5.80	3.0
Edgar				3.35	
Ellis				2.75	
Ericson				6.75	T.
Ewing				4.24	
Fairbury	92	28	55.4	5.10	
Fairmont	89	28	52.9	4.30	
Fort Robinson	86	20[f]	47.6[c]	2.30	0.3
Franklin	90[c]	28[c]	57.8[c]	3.87	
Fremont	90	28	53.6	6.18	
Fullerton				5.70	
Geneva	89	29	55.2	5.89	
Genoa (near)	89	31	54.6	7.17	
Gering	86	22	50.1	2.80	T.
Gordon				4.50	2.0
Gosper				4.80	0.5
Gothenburg	91	22	54.1	3.97	T.
Grand Island	90	30	54.3	4.88	
Grant	93	20	52.3	3.43	
Greeley				3.90	
Guide Rock				4.98	
Haigler				3.10	
Halsey	96	24	51.6	6.37	
Hartington	89	20	49.0	5.22	
Harvard	87	28	52.1	5.92	T.
Hastings *1	88	33	54.6	3.52	1.0
Hayes Center	92	25	52.1	7.75	
Hay Springs	87	18	48.2	3.08	T.
Hebron	91	28	55.0	3.27	
Hendley				3.30	
Hickman				1.75	
Holbrook	89	25	53.2	4.94	2.0
Holdrege	89[c]	28	56.2	7.90	
Hooper *1	90	32	52.8	6.15	
Imperial	90	20	51.2	5.97	2.0
Kearney	89	30	54.4	5.84	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Kennedy	94	22	51.4	2.75	12.0
Kimball	81	23	47.8	2.52	0.5
Kirkwood	91	21	51.3	4.42	T.
Leavitt	90	28	53.2	7.51	
Lexington	91	25	52.2	6.11	3.0
Loup	88	23	52.3	6.55	
Lynch	94	22	54.2	3.76	
McCook				2.44	0.1
McCool				5.97	
Madison	87	27	51.5	6.18	T.
Marquette				6.57	T.
Mason				9.40	
Minden	90	29	52.8	4.28	T.
Monroe				6.39	
Nebraska City	91	28	56.6	2.64	
Nemaha				4.45	
Norfolk	89	25	52.6	5.70	
North Loup	90	25	53.4	6.41	
Oakdale	89	24	50.6	4.90	0.1
Oakland	89	27	52.7	3.31	
Odell				1.93	
Ord				7.95	
Palmer				8.02	
Palmyra *[1]	90	30	55.0	2.05	
Pawnee City	90	28	56.3	2.44	
Plymouth				3.90	
Purdum	94	21	50.1	5.17	T.
Ravenna	88	26	53.2	6.39	0.1
Redcloud	91	28	57.5	4.52	
Rulo				4.14	
St. Libory				7.24	T.
St. Paul	90	27	54.1	6.17	T.
Santee	96	24	55.1	2.99	
Schuyler				3.77	
Seward	89	28	53.7	5.55	
Smithfield				5.30	
Springview	88	20	50.4	3.80	
Stanton	89	25	53.2	6.07	
Strang				5.53	
Stratton				2.93	
Strausburg				7.49	
Superior	95	29	55.7	4.44	
Syracuse				2.18	
Tablerock				3.04	
Tecumseh	79[c]	28[c]	55.1[c]	1.87	
Tekamah	91	29	55.2	4.32	
Turlington	91	30	55.4	2.25	
University Farm	89	30	56.0	2.86	
Wahoo				7.72	
Wakefield	89	25	51.6	3.58	
Wallace				4.25	
Wauneta				4.05	
Weeping Water				1.89	T.
Westpoint	90	27	54.7	5.54	
Whitman				2.28	3.0
Wilber				3.98	
Wilsonville				5.10	
Winnebago	84	19	51.6	3.08	T.
Wisner				8.48	
Wymore				1.52	
York	88	29	53.4	5.25	
Nevada.					
Amos	82	22	48.4	0.20	
Austin	73	18	43.4	2.56	9.0
Battle Mountain	85	20	53.5		
Beowawe *[1]	80	28	54.7	1.40	8.0
Carlin *[1]	80	30	49.2	1.15	4.0
Carson City	79	22	46.5	0.97	
Columbia	76	19	46.4	1.22	3.0
Dyer	79	19	46.1	1.75	
Elko *[1]	80	35	52.7		
Eureka	73	14	43.2	1.26	10.0
Fallon	84	18	50.5	0.76	
Geyser	75	17	42.6	1.86	2.5
Golconda *[1]	70	28	44.6	1.50	
Halleck				1.20	5.0
Hazen	83	16	49.5	0.86	
Humboldt	80	25	54.6	T.	
Lovelocks	83	25	54.3	T.	
Martins	90	19	51.0	1.75	
Mill City *[1]	82	38	51.2	0.90	
Morey	70	14	41.0	1.64	0.4
Palisade	86	9	48.8	1.45	1.0
Palmetto	75	12	41.1	4.33	32.0
Pioche	85	13	42.2	2.89	14.5
Potts	72	15	41.0	0.50	6.0
San Jacinto	79	14	47.0	0.35	1.0
Squaw Valley	82	19	44.3	1.75	T.
Tecoma	85	11	49.8	1.30	4.0
Wabuska	80	18	47.4	1.05	
Wadsworth	85	18	49.8	0.20	
Wells *[1]	64	27	47.3		
Wood	82	21	45.2	1.39	
New Hampshire.					
Alstead	68	21	41.8	2.07	3.0
Bartlett				1.83	11.5
Bethlehem	66	13	38.8	1.42	3.0
Brookline *[1]	76	18	46.3	2.34	6.1

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
New Hampshire—Cont'd.	°	°	°	*Ins.*	*Ins.*
Durham	71	17	43.2	2.93	5.0
Franklin Falls	73	15	42.6	2.75	12.0
Grafton	72	12	41.4	2.15	11.0
Groveton				1.73	6.3
Hanover	72	13	41.7	1.55	10.0
Jefferson Highland				1.18	5.0
Keene	75	15	43.1	2.03	4.0
Nashua	76	21	45.6	2.75	3.5
Newton	70	17	43.3	3.14	3.0
North Woodstock				1.78	
Plymouth	73	20	43.8	2.38	8.3
New Jersey.					
Asbury Park	76	28	50.9	3.00	
Bayonne	78	29	51.2	5.21	T.
Belvidere	81	23	51.9	4.66	
Bergen Point	78	29	51.3	5.91	T.
Beverly	82	27	52.9	2.85	
Bridgeton	87	26	55.0	2.31	
Browns Mills	83[d]	22[c]	52.6[d]		
Canton				2.18	
Cape May C. H.	80	25	53.2	1.54	
Charlotteburg	75	20	48.0	4.37	T.
Clayton	83	27	52.8	2.94	
College Farm	80	25	51.6	4.38	
Dover	74	23	48.4	4.66	
Elizabeth	81	30	53.9	4.00	
Englewood	76	28	51.0	6.42	T.
Flemington	81	26	51.9	3.30	
Friesburg	86	25	52.7	2.73	
Hightstown	77	27	50.0	4.07	T.
Imlaystown	82	27	53.5	2.67	T.
Indian Mills	85	24	53.2	2.92	
Jersey City	77	29	52.0	5.83	T.
Lakewood	82	26	51.6	3.18	T.
Lambertville	82	25	52.7	3.38	T.
Layton	76	17	47.2	4.31	T.
Moorestown	81	26	52.4	2.71	
Newark	78	29	52.1	5.68	
Newton	78	23	49.2	4.74	
Oceanic	76	29	51.8	3.11	
Paterson	80	28	53.5	5.49	T.
Phillipsburg	79	28	51.4	3.84	
Plainfield	78	27	51.2	4.52	
Pleasantville				2.29	
Rancocas				3.20	T.
Rivervale	75	19	48.4	2.96	
Sandy Hook	73	30	50.2	3.36	
Somerville	81	23	51.4	4.34	T.
South Orange	76	30	50.8	5.29	T.
Sussex	77	23	50.2	4.83	T.
Toms River	85	23	51.4	2.95	T.
Trenton	80	28	53.4	3.84	
Tuckerton	79	22	51.3	2.15	
Vineland	86	25	52.8	2.45	
Woodbine	82	24	52.0	2.12	
New Mexico.					
Alamagordo	85	35	59.6	0.99	
Albert	82	30	55.7	1.55	2.0
Albuquerque	74	36	57.4	1.05	
Artesia	86	37	58.8	2.62	
Bellranch	83	31	55.6	2.66	
Bloomfield	81	28	52.6	1.97	T.
Carlsbad	90	38	61.0	3.46	
Chama	69	16	41.4	2.89	17.0
Cimarron	78	24	48.2	1.15	2.0
Cliff	87	29	56.4	0.25	
Cloudcroft	63	22	41.2	1.60	0.5
Datil	74	13	45.9	0.63	
Deming	85	31	57.0	0.10	
Dorsey	78	15	46.7	1.28	T.
Eagle Rock Ranch	74	21	47.6	2.91	10.0
Elk	77	30	53.2	2.58	
Engle	80	31	54.8	0.25	
Espanola	75	27	51.8	0.95	
Estancia	75	20	48.6	1.37	T.
Fairview	79	22	50.6	1.50	
Fort Bayard	79	31	54.5	0.79	
Fort Stanton	74	22	50.4	1.40	
Fort Union	71	16	45.8	1.72	6.5
Fort Wingate	72	10	47.0	4.65	
Fruitland	80	30	52.6	1.43	
Gallinas Spring	76	31	52.4	1.51	3.0
Glen	84	34	58.2	1.61	
Gran Quivira				1.79	
Hillsboro	79	35[b]	56.6[d]	0.88	
Hope				2.76	
Laguna	76	28	50.6	0.45	
Lagunita	80	25	52.8	2.24	1.5
Lake Valley				0.59	
Las Vegas	75	25	49.3	2.17	8.0
Logan	83	31	56.0	3.80	6.0
Lordsburg	85	33	59.0	0.07	
Los Alamos				2.34	
Los Lunas	84	33	58.6	0.80	
Luna	73	19	45.7	0.68	T.
Magdalena	89	23	52.4	1.38	T.
Manuelito				0.75	
Maxwell				0.15	0.5

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mesilla Park	87	34	60.0	0.50	
Mineral Hill				2.78	7.0
Monument	86	39	61.2	1.88	
Nara Visa	83	30	56.3	2.30	
Orange	88	36	61.1	0.71	
Palma				0.06	
Portales	84	32	57.1	3.89	
Raton	75	29	52.5		
Redrock				0.21	
Rincon	87	31	58.8	0.37	
Rociada	64	16	42.6	2.98	7.0
Rosa				1.46	
Rosedale	73	28	49.8	1.70	
San Marcial	90	33	60.1	T.	
San Rafael	76	25	50.2	0.91	
Socorro	84	31	57.6	0.65	
Strauss				T.	
Taos	74	24	47.6	1.18	T.
Tres Piedras	69	12	42.4	1.10	3.0
Tucumcari	82	30	56.9	1.79	1.5
Valley				2.30	
Vermejo	69	20	43.3	2.06	1.0
Weed				1.56	
Whiteoaks				1.62	
Windsor				T.	
New York.					
Adams				1.29	2.0
Addison	78	21	46.6	1.40	T.
Akron				2.35	
Amsterdam	74	20	45.0	3.22	4.5
Angelica	78	18	43.4	1.42	T.
Appleton	75	25	45.4	1.71	2.0
Arcade	77	19	42.2	2.55	1.0
Athens	75	24	47.4	3.66	1.5
Atlanta	75	20	44.6	2.52	
Atwater				2.18	0.3
Auburn	74	22	46.1	1.54	1.0
Avon	77	22	45.2	1.79	T.
Baldwinsville	70	24	44.0	2.57	
Ballston Lake	73	22	45.2	3.09	6.0
Bedford	75	24	49.2	3.96	
Berlin	71	17	44.3	3.06	
Blue Mountain Lake				2.58	13.5
Bolivar	77	17	44.0	1.91	2.5
Bouckville	70	20	43.4	2.42	3.0
Brockport	77	25	46.5	2.05	
Cape Vincent	67	22	41.8	1.85	
Carmel	75	25	46.9	5.41	0.5
Carvers Falls	72	11	43.0	1.29	2.0
Chatham	76	19	46.8	3.30	1.0
Chazy	70	18	42.4	0.20	1.0
Coeymans	78	21	46.6	2.70	T.
Cold Spring Harbor	74	21	48.4	5.39	T.
Cooperstown	71	19	40.8	2.83	T.
Cortland	72	21	45.3	1.67	T.
Cutchogue	71	25	48.0	2.81	
Dannemora	67	14	40.7	0.35	2.0
Dekalb	75	18	42.8	0.88	2.0
De Ruyter	73	18	42.3	2.73	2.0
Easton				1.84	1.5
Elba	76	24	43.9	1.85	2.0
Elmira	80	22	48.6	2.05	
Faust	69	9	38.8	0.86	2.5
Fayetteville	77	20	46.6	2.16	0.5
Fort Plain	74	24	46.4	2.89	3.0
Franklinville	78	19	43.0	2.90	3.0
Gabriels	69[d]	13[d]	37.4[d]	0.80	3.5
Gansevoort				1.65	3.0
Glens Falls	73	20	45.7	2.70	5.5
Gloversville	72	20	43.2	3.25	10.5
Greenfield	73	19	43.8	1.77	7.0
Greenwich	73[e]	20[c]	44.6[c]	2.90	2.0
Griffin Corners	70	14	40.9	2.89	2.9
Harkness	70	19	41.5	0.65	
Haskinville				2.22	T.
Hemlock	71	22	45.0	1.19	
Hunt	80	21	44.9	1.51	0.5
Indian Lake	70	7	39.7	1.70	
Ithaca	74	23	44.7	1.77	1.3
Jamestown	80	22	46.2	2.04	T.
Jeffersonville	74	17	44.1	3.45	1.0
Keene Valley	71	12	41.6	1.39	7.5
Lake George	73	19	44.5	2.68	12.1
Le Roy	79	24	46.0	1.87	1.8
Liberty	70	20	42.6	4.69	2.0
Littlefalls, City Res.	72	20	43.4	2.25	6.0
Lockport	76	26	45.6	1.65	
Lowville	72	18	41.5	1.17	3.0
Lyndonville				1.83	2.0
Lyons	77	26	46.6	2.39	T.
Middletown	74	27	49.4	4.38	T.
Mohonk Lake	73	23	45.5	5.16	9.5
Moira	78	17	43.3	0.64	T.
Mount Hope	76	22	49.2	4.98	T.
Newark Valley				2.67	2.0
New Lisbon	70	14	40.6	3.06	
North Lake	69	5	36.5	2.95	7.0
Ogdensburg	75	25	45.9	1.03	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Oneonta	75	20	45.6	4.04	T.
Oriskany Falls	72	19	43.5	1.54	2.0
Otto	76	22	46.6	1.97	
Oxford	71	20	44.0	2.78	......
Oyster Bay	73	28	49.0	5.07	T.
Palermo	......	......	......	2.09	2.0
Perry City	74	18	43.0	1.80	0.2
Plattsburg	70	20	44.0	1.30	3.0
Port Jervis	78	22	48.8	4.27	
Potsdam	79	18	43.8	1.22	1.0
Richland	......	......	......	2.00	T.
Richmondville	75	17	44.6	3.50	4.0
Ridgeway	73	27	45.6	2.36	2.2
Romulus	75	22	46.3	1.26	
Salisbury Mills	......	......	......	4.32	T.
Saranac	69	8	38.8	0.94	4.1
Scarsdale	76	22	50.2	2.62	T.
Setauket	72	31	48.4	3.57	T.
Shortsville	75	23	45.2		
Skaneateles	......	......	......	3.04	
Southampton	68	26	46.8	4.27	T.
South Canisteo	75	18	44.2	1.95	1.0
South Schroon	70	17	41.5	1.87	10.5
Ticonderoga	71	18	44.0	1.25	2.5
Volusia	77	22	44.3	2.19	5.0
Wappinger Falls	76	22	48.0	3.95	1.0
Warwick	......	......	......	3.43	
Watertown	75	20	43.7	1.53	2.0
Waverly	78	18	45.8	2.29	2.5
Wedgwood	74	21	44.6	1.49	0.5
Wells	74	10	41.6	2.44	11.0
West Berne	75	17	44.4	1.40	4.0
Westfield	75	23	46.0	2.15	5.0
Windham	75	16	43.1	2.44	3.0
Youngstown				1.31	4.0
North Carolina.					
Battleboro	......	......	......	0.55	
Beaufort	78	39	61.3	0.50	
Brevard	85	26	56.6	3.43	
Bryson City	......	......	......	3.31	
Buck Springs	75	19	51.3	4.47	
Caroleen	88	30	61.4	2.35	
Catawba	......	......	......	1.82	
Chalybeate Springs	91	28	62.5	0.68	
Chapelhill	90	33	61.6	1.32	
Eagletown	92	30	60.5	1.46	
Edenton	90	33	60.4	1.10	
Fayetteville	89	34	64.3	1.25	
Goldsboro	91	33	62.3	0.52	
Graham	......	......	......	0.82	
Greensboro	91	34	60.7	1.22	
Greenville	......	......	......	0.65	
Henderson	87	32	59.8	1.66	
Hendersonville	82	30	57.2	2.42	
Horse Cove	78	30	58.0	3.91	
Hot Springs	87	30	58.6	......	
Kinston	94	30	63.8	0.52	
Lenoir	86	27	59.3	1.24	
Lexington	91	29	59.5	1.29	
Lincolnton	90	30	60.5	......	
Linville	72	20	48.8	3.61	
Louisburg	88	32	61.1	1.05	
Manteo	82	31	57.2	2.61	
Marion	89	28	60.6	3.17	
Moncure	94	29	58.8	1.44	
Monroe	88	25	60.6	2.17	
Morganton	88	27	59.5	1.30	
Mountairy	88	30	57.0	3.44	
Mount Holly	......	......	......	1.40	
Murphy	......	......	......	2.69	
Nashville	94	30	62.2	0.63	
Newbern	89	32	62.8	2.24	
Patterson	82	27	56.0	2.62	
Pinehurst	91	30	65.8	1.89	
Pink Beds	77	18	50.0	4.49	
Pittsboro	91	30	62.0	0.71	
Randleman	......	......	......	1.27	
Reidsville	92	32	61.5	1.78	
Salem	89	27	60.0	1.76	
Salisbury	89	33	62.4	1.79	
Sapphire	80	17	53.0	7.04	
Saxon	90	26	57.6	1.60	
Scotland Neck	91	33	62.5	1.20	
Selma	93	31	62.4	1.10	
Settle	89	27	61.0	1.63	
Sloan	88	30	62.0	1.15	
Snowhill	92	29	61.8	0.64	
Southern Pines	92	35	64.4	1.72	
Southport	85	34	63.0	0.84	
Statesville	88	30	61.4	1.49	
Tarboro	93	32	62.3	0.71	
Vade Mecum	88	23	58.2	1.09	
Washington	89	30	62.8	0.50	
Wash Woods	84	36	57.2	0.44	
Waynesville	82	24	54.7	3.15	
Weldon	91	30	61.0	1.84	
Whiteville	90	28	61.6	1.15	
North Dakota.	°	°	°	*Ins.*	*Ins.*
Amenia	83	24	46.6	2.34	
Ashley	87	18	47.6	2.30	4.0
Berlin	79	18	46.3	2.47	4.0
Bottineau	83	10	46.8	0.69	0.3
Buford	87	12	48.6	1.79	2.0
Cando	82	18	46.6	0.84	0.2
Chilcot	84	11	48.6	1.11	0.5
Coalharbor	83	20	48.8	0.98	0.2
Cooperstown[g]	77	23	48.8	......	
Denhoff	77	19	46.1	0.42	1.4
Dickinson	83	13	48.2	1.10	T.
Donnybrook	80	14	45.6	1.62	T.
Dunseith	84	11	46.7	0.66	
Edgeley	85	22	47.6	1.58	3.0
Edmore	80	17	47.1	1.30	3.0
Fargo	82	26[b]	46.6[d]	2.21	
Flasher	86	19	50.2	1.58	
Forman	86	24	49.0	2.52	T.
Fort Berthold	85	17	50.0	1.77	T.
Fort Yates	85	21	50.3	0.87	T.
Fullerton	82	21	46.6	2.82	6.3
Gackle	80[d]	19[d]	45.6[d]	1.60	2.0
Glenullin	85	15	47.9	1.13	T.
Grafton	80	21	47.3	0.97	T.
Hamilton	80	20	45.2	0.97	3.0
Hannah	82	19	45.4	0.64	1.4
Hillsboro	78	23	48.2	2.90	
Jamestown	......	......	......	2.07	6.2
Kulm	85	20	47.6	2.60	3.0
LaFollette	86	10	49.6	1.22	0.7
Langdon	80	19	46.3	0.91	1.6
Larimore	77	16	45.6	1.63	2.4
Lisbon	79	18	45.4	2.60	
McKinney	84	15	46.4	1.00	
Manfred	86	18	48.0	0.68	T.
Melville	85	20	47.4	1.25	4.0
Miiton	80	20	46.4	1.00	
Minnewaukon	78[b]	25[c]	48.0[c]	1.39	
Minot	86	14	47.0	1.03	T.
Minto	80	21	47.3	1.52	
Moyersville	84	16	46.9	0.68	T.
Napoleon	88	14	46.6	1.55	5.0
New England	82	27	51.2	1.24	T.
Oakdale	81	15	47.8	1.90	2.0
Oriska	77	23	47.2	3.51	2.0
Park River	79	22	47.2	0.95	0.5
Pembina	84	14	46.7	0.90	2.0
Portal	82	18	47.2	1.17	2.6
Power	83	20	47.8	2.91	T.
Pratt	85	13	47.6	0.80	0.2
Rolla	79	16	44.8	1.04	1.3
Sentinel Butte	85	8	49.1	1.57	3.0
Steele	83	18	47.6	1.25	
University	80	20	48.2	1.98	
Wahpeton	80[d]	24[d]	49.4[d]	1.94	
Walhalla	80	17	46.6	0.69	
Washburn	86[b]	17[c]	50.0[c]	0.75	
Wishek	85	18	46.0	1.58	0.5
Ohio.					
Akron	80	24	49.6	1.19	1.5
Amesville	88	23	56.0	1.78	
Atwater	78	18	48.4	1.95	0.5
Bangorville	80	20	51.7	1.98	T.
Bellefontaine	82	18	50.8	1.35	0.5
Benton Ridge	82	21	52.0	1.91	
Bladensburg	84	22	51.0	2.74	
Bowling Green	82	20	51.0	2.22	
Bucyrus	82	21	52.8	2.11	
Cadiz	83	21	52.8	2.08	T.
Cambridge	84	22	53.0	3.08	
Camp Dennison	87	25	55.5	1.44	
Canal Dover	81	22	49.9	2.92	T.
Canton	78	24	49.7	1.47	
Cardington	81	23	50.7	2.10	
Chillicothe	85[d]	29[d]	55.4[d]	0.94	
Circleville	86	25	55.0	1.16	
Clarington	86	22	54.2	6.20	
Clarksville	83	25	54.8	2.14	
Cleveland *b*	79	24	48.6	1.77	2.0
Coalton	87	21	55.3	0.88	
Dayton	85	24	53.8	1.40	
Defiance	84	20	51.0	1.88	
Delaware	82	22	51.7	1.81	
Demos	83	23	53.6	3.48	T.
Findlay	84	22	53.0	1.86	
Frankfort	86	26	55.6	1.00	
Fremont	85	22	52.4	1.79	
Garrettsville	79	21	47.6	2.41	1.5
Granville	84	24	52.2	1.62	
Gratiot	82	23	52.0	1.73	T.
Green	88	27	56.0	1.08	
Greenhill	80	19	47.4	1.39	T.
Greenville	84	23	53.3	1.61	
Hedges	84	20	51.4	2.89	
Hillhouse	75	22	46.6	2.13	T.
Hiram	78	22	48.8	2.32	2.0
Hudson	82	21	48.0	1.71	2.0
Ironton	91	27	58.8	1.00	
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Jacksonburg	86	25	55.8	1.61	
Killbuck	82	23	52.2	2.80	
Lancaster	83	25	53.9	1.33	
Lima	82	21	52.0	3.25	
McConnelsville	85	23	53.6	2.28	
Manara	83	25	54.0	1.09	
Mansfield	......	......	......	2.75	
Marietta	87	27	56.2	3.01	
Marion	84	20	52.6	2.25	T.
Medina	81	20	49.9	1.53	2.0
Milfordton	82	21	50.4	1.33	T.
Milligan	84	23	53.4	2.07	
Millport	79	21	48.5	2.00	T.
Montpelier	81	22	50.2	1.95	T
Napoleon	82	24	51.7	2.17	
Nellie	......	......	......	3.30	T.
New Alexandria	82	21	51.8	2.30	T.
New Berlin	80	22	49.4	1.73	
New Bremen	82	20	53.4	1.02	T.
New Richmond	88	26	57.0	1.39	
New Waterford	80	22	48.6	2.42	T.
North Royalton	80	26	49.4	1.61	
Norwalk	83	22	50.5	2.18	T.
Oberlin	81	20	49.6	1.16	
Ohio State University	83	25	52.4	1.54	
Orangeville	80	22	45.7	2.05	
Ottawa	84	26	53.2	2.29	
Pataskala	83	23	53.0	2.05	
Philo	83	24	54.0	1.17	
Plattsburg	84	24	53.4	1.12	
Pomeroy	88	22	53.6	1.38	
Pulse	85	25	54.8	1.42	
Rittman	84	21	49.4	1.80	
Rockyridge	84	20	50.5	1.93	T.
Shenandoah	81	20	49.1	3.21	0.5
Sidney	85	21	54.0	1.36	
Somerset	85	24	53.8	2.05	
South Lorain	83	19	48.4	1.63	1.2
Springfield	......	......	......	1.42	
Summerfield	84	21	51.8	3.16	T.
Thurman	89	25	57.0	1.37	
Tiffin	79	24	51.4	2.05	T.
Toledo (St. Johns College)	82	25	50.8	1.60	
Upper Sandusky	82	22	52.8	2.12	
Urbana	85	21	52.6	1.86	
Vickery	84	20	49.4	1.59	T.
Warren	82	24	48.0	2.21	0.6
Wauseon	84	20	49.2	1.90	T.
Waverly	89	25	56.3	1.56	
Waynesville	85	24	54.8	1.90	
Wellington	81	21	50.8	1.54	
Willoughby	......	......	......	2.04	1.0
Wilson	89	23	55.4	1.37	
Wooster	80	21	51.9	2.27	0.2
Zanesville	......	......	......	1.73	
Oklahoma.					
Alva	90	40	62.2	3.21	
Arapaho	95	34	63.0	4.42	
Binger	87	37	62.8	5.38	
Blackburn	90	35	63.0	5.31	
Cache	89	41	64.1	7.15	
Chandler	93	37	65.9	4.62	
Enid	86	34	60.6	2.80	
Fort Reno	92	35	62.3	4.50	
Fort Sill	86	31	62.4	5.15	
Gage	89	32	58.8	1.97	
Guthrie	89	39	64.4	4.92	
Harrington	87	32	59.4	4.93	
Hennessey	87	39	63.8	4.20	
Hobart	87	36	63.2	4.81	
Jenkins	90	35	62.2	2.60	
Kenton	84	25	54.8	2.43	3.0
Kingfisher	88	37	62.6	4.03	
McComb	86	41	62.8	3.72	
Mangum	90	40	64.2	5.90	
Meeker	89	34	61.6	3.77	
Neola	87	32	62.2	6.00	
Newkirk	87	37	63.0	2.64	
Norman	89	36	62.6	3.89	
Pawhuska	90	35	64.0	2.43	
Perry	88	35	62.6	5.11	
Sac and Fox Agency	88	40	64.3	3.87	
Shawnee	89	40	64.0	3.55	
Stillwater	87	37	61.6	4.33	
Taloga	90	33	58.6	3.40	
Temple	87	43	66.4	6.66	
Watonga	88	35	61.2	3.95	
Waukomis	87	36	62.3	4.33	
Weatherford	89	33	61.2	3.19	
Whiteagle	90	37	62.6	2.21	
Oregon.					
Alba	......	......	......	1.25	
Albany	......	......	......	2.01	
Alpha	90	30	53.3	3.69	
Ashland	88	30	53.3	1.04	0.1
Astoria	77	34	51.8	2.94	
Aurora (near)	85	28	53.6	1.95	
Bay City	80	29	50.4	4.28	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Oregon—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bend	84	12	45.8	0.07	
Beulah	85	19	49.6	0.50	
Blackbutte	80	29	49.6	2.90	
Blalock	90	37	58.6	0.60	
Bullrun	.....	.....	.....	3.60	
Burns	70	24	47.0	0.27	
Carlton	85	28	51.7	1.34	
Cascade Locks	85	31	55.2	2.80	
Coquille	.....	.....	.....	2.15	
Corvallis	88	28	53.7	2.38	
Dale	.....	.....	.....	1.05	
Dayville	88	27	52.8	0.60	1.0
Doraville	87	29	51.5	1.51	
Drain	92	29	53.8	2.31	
Echo	92	30	55.6	0.02	
Ella	89	30	57.0	0.17	
Eugene	87	29	53.4	1.83	
Fairview	89	30	52.2	4.09	T.
Falls City	85	29	51.6	3.28	
Forestgrove	89	28	53.7	2.21	
Gardiner	73	30	52.0	1.57	
Glendale	88	29	51.8	1.76	T.
Glenora	90	28	52.3	5.43	
Gold Beach	76	32	51.6	5.71	
Government Camp	.....	.....	.....	1.80	7.0
Granite	74	13	43.3	0.70	
Grants Pass	94	30	53.5	1.27	
Grass Valley	82	23	49.0	0.10	
Heisler	92	23	52.2	0.38	
Heppner	85	28	53.6	0.36	
Hood River	87	30	55.3	0.75	
Huntington	85	27	53.2	0.08	
Jacksonville	91	29	53.2	0.98	
John Day	90	23	51.6	1.33	3.0
Joseph	79	24	45.8	0.49	1.7
Kerby	89	27	52.4	2.52	
Klamath Falls	74	23	47.7	0.35	
Lagrande	84	26	50.2	1.14	
Lakeview	80	12	45.9	0.53	
Lonerock	84	23	48.2	0.82	
McKenzie Bridge	93	24	52.0	2.89	
McMinnville	90	35	58.0	1.17	
Marble Creek	102	24	48.5	0.46	
Marshfield	80	30	51.4	2.90	
Meacham	.....	.....	.....	1.90	8.0
Mill City	86	27	51.0	2.80	
Monroe	80	28	53.4	1.93	
Mount Angel	87	34	55.6	2.25	
Nehalem	.....	.....	.....	4.29	
Newport	72	35	50.2	3.95	
Odell	.....	.....	.....	0.61	
Ontario	.....	.....	.....	0.70	
Paisley	79	18	47.0	0.44	
Pendleton	86	27	53.0	0.22	
Port Orford	71	36	51.4	5.02	
Prineville	85	20	45.8	0.44	
Prospect	77	23	45.2	1.45	
Richland	84	25	49.8	0.25	
Riverside	89	20	49.7	0.50	1.5
Salem	85	31	54.6	1.58	
Silverlake	80	12	42.6	0.38	
Sparta	75	25	49.5	0.06	
Stafford	88	30	54.3	2.23	
The Dalles	88	31	56.8	0.11	
Toledo	80	28	51.0	3.71	
Umatilla	90	30	58.3	0.04	
Van	.....	.....	.....	0.20	1.5
Wallowa	85	24	47.8	0.29	0.5
Wamic	84	23	52.1	0.51	
Warm Spring	90	25	53.3	0.23	
Weston	87	20	51.3	0.93	1.0
Williams	90	26	52.4	0.50	
Pennsylvania.					
Aleppo	82	21	51.0	3.43	T.
Altoona	76	22	49.8	2.26	
Baldwin	79	20	48.0	0.75	T.
Beaver Dam	.....	.....	.....	2.23	
Bellefonte	80	23	52.4	2.51	
Browers	.....	.....	.....	4.33	
California	82	24	52.2	1.87	
Cassandra	76	19	46.4	1.62	2.0
Centerhall	74	22	48.2	2.25	
Clarion	.....	.....	.....	2.86	T.
Claysville	80	20	51.8	2.74	T.
Clearfield	.....	.....	.....	3.58	T.
Coatsville	85	25	52.6	3.99	
Derry	82	28	51.4	2.29	
Davis Island Dam	.....	.....	.....	1.93	0.4
Doylestown	.....	.....	.....	4.52	
East Mauch Chunk	81	23	50.2	5.18	
Easton	78	29	51.5	3.92	
Ellwood Junction	.....	.....	.....	2.38	
Emporium	75	20	47.0	2.94	T.
Ephrata	81	21	51.5	3.72	
Everett	77	25	49.6	2.47	T.
Forks of Neshaminy	.....	.....	.....	3.01	
Franklin	82	18	46.6	2.36	T.
Freeport	83	20	51.4	2.47	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Gettysburg	85	24	54.0	4.53	
Girardville	.....	.....	.....	6.21	
Gordon	76	18	48.2	6.96	T.
Greensboro	.....	.....	.....	3.02	
Greenville	81	21	47.4	2.36	T.
Hamburg	81	28	51.5	5.04	
Hanover	86	26	55.6	4.45	
Herrs Island Dam	.....	.....	.....	1.91	
Huntingdon	77	23	50.8	2.65	T.
Hyndman	.....	.....	.....	2.58	
Indiana	79	24	49.6	2.72	T.
Irwin	82	22	52.6	2.01	T.
Johnstown	80	26	51.4	2.87	
Kennett	84	27	53.6	4.55	
Lansdale	.....	.....	.....	3.57	
Lawrenceville	78	20	46.6	1.43	
Lebanon	84	25	53.0	4.58	
Leroy	70	20	45.0	2.69	6.0
Lewisburg	79	24	50.7	4.53	
Lockhaven	79	25	51.4	3.13	T.
Lock No. 4	.....	.....	.....	2.66	
Lycippus	80	21	51.2	1.90	4.0
Marion	83	24	52.6	2.70	
Mifflintown	78	23	51.0	3.49	
Milford	78	19	46.9	3.40	T.
Montrose	89	24	44.0	3.43	8.0
New Germantown	82	23	52.6	2.86	T.
Ottsville	.....	.....	.....	3.45	
Parker	.....	.....	.....	2.22	
Penmar	.....	.....	.....	4.24	
Philadelphia	82	30	55.0	3.73	
Pocono Lake	71	12	42.6	4.26	
Point Pleasant	.....	.....	.....	3.42	
Pottsville	.....	.....	.....	5.24	
Reading	82	26	52.8	4.30	
Renovo	.....	.....	.....	2.38	
Saegerstown	81	18	45.4	3.21	T.
St. Marys	74	20	45.8	3.14	
Saltsburg	.....	.....	.....	1.05	
Seisholtzville	.....	.....	.....	3.92	
Selinsgrove	77	23	50.5	4.17	T.
Shawmont	.....	.....	.....	3.16	
Skidmore	79	21	48.0	2.07	T.
Smiths Corners	.....	.....	.....	3.52	
Somerset	78	24	47.5	3.26	1.8
South Eaton	74	25	47.3	3.67	5.0
Springdale	.....	.....	.....	2.10	
Springmount	.....	.....	.....	3.74	
State College	75	23	49.4	2.12	T.
Swarthmore	84	28	53.2	3.12	
Towanda	75	20	46.2	2.61	3.0
Uniontown	83	22	52.2	2.41	.....
Warren	80	19	46.6	2.20	0.2
Wellsboro	74	20	45.6	1.17	T.
Westchester	84	26	53.0	3.66	
West Newton	.....	.....	.....	1.84	
Wilkesbarre	76	25	49.0	3.50	T.
Williamsport	76	27	50.2	3.22	
Rhode Island.					
Bristol	66	28	46.6	2.65	
Kingston	72	20	45.4	3.72	
Pawtucket	77	31	51.2	2.72	
Providence	75	28	49.7	2.75	
South Carolina.					
Aiken	90	37	65.8	1.85	
Allendale	90	39	66.8	0.94	
Anderson	90	37	64.2	1.59	
Barksdale	87	38	62.0	1.15	
Batesburg	90	36	64.8	1.90	
Beaufort	88	40	66.7	1.43	
Bennettsville	93	34	65.5	0.46	
Blackville	91	37	66.6	1.05	
Blair	.....	.....	.....	0.64	
Bowman	91	34	65.8	0.79	
Calhoun Falls	.....	.....	.....	2.84	
Camden	.....	.....	.....	1.70	
Chappells	.....	.....	.....	1.28	
Cheraw	88	35	63.8	1.98	
Clarks Hill	88	36	64.4	1.47	
Clemson College	87	32	63.0	1.89	
Conway	90	32	64.4	0.60	
Darlington	90	32	64.7	0.37	
Dillon	92	32	63.8	1.34	
Due West	86	40	64.4	1.60	
Edisto	.....	.....	.....	0.74	
Effingham	.....	.....	.....	1.40	
Enoree	.....	.....	.....	0.70	
Florence	93	34	63.8	0.69	
Gaffney	90	33	62.9	1.33	
Georgetown	86	38	64.6	1.25	
Greenville	85	31	59.4	1.35	
Greenwood	87	40	63.8	2.28	
Heath Springs	93	33	65.3	0.97	
Kingstree	86	41	68.0	2.43	
Liberty	88	33	64.0	2.62	
Little Mountain	86	39	64.8	1.49	
Newberry	89	34	64.7	1.82	
Pinopolis *1	86	41	65.6	0.73	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Georges	89	40	68.2	0.60	
St. Matthews	86	39	64.6	1.07	
St. Stephens	.....	.....	.....	1.80	
Saluda	89	32	64.8	1.44	
Santuck	90	34	63.4	1.67	
Seivern	90	28	62.4	2.43	
Smiths Mills	.....	.....	.....	1.55	
Societyhill	87	36	64.8	0.59	
Spartanburg	90	35	63.4	1.34	
Statesburg	88	37	66.4	0.94	
Summerville	92	35	66.4	1.55	
Sumter	92	35	66.7	1.50	
Trenton	87[e]	40[e]	64.3[e]	1.57	
Trial	90	34	65.2	1.21	
Walterboro	91	33	64.8	1.50	
Winnsboro	89	38	64.7	1.65	
Winthrop College	89	36	63.8	1.22	
Yemassee	92	36	64.6	1.20	
Yorkville	92	38	65.7	2.25	
South Dakota.					
Aberdeen	92	19	49.2	5.16	
Academy	89	23	51.2	6.04	0.5
Alexandria	91	24	50.2	2.07	
Armour	87	24	51.0	3.98	
Bowdle	87	20	49.4	2.26	8.0
Brookings	86	21	48.0	1.40	
Canton	89	24	50.2	2.27	T.
Castlewood	85	22	47.8	1.43	0.3
Centerville	90	24	50.8	1.16	
Chamberlain	94	23	52.6	3.91	.....
Cherry Creek	88	17	53.7	0.69	
Clark	82	23	47.6	3.99	T.
Clear Lake	84	20	47.9	1.61	
Desmet	87	20	49.3	3.06	
Doland	89	19	49.6	5.34	
Elkpoint	92	24	53.0	2.88	
Fairfax	90	20	51.4	4.85	
Farmingdale	.....	.....	.....	0.99	
Faulkton	89	18	50.1	3.03	
Flandreau	91	23	48.8	1.00	
Forestburg	90	19	49.3	2.47	
Fort Meade	85	20[j]	50.6[e]	0.25	T.
Gannvalley	91	19	51.0	2.69	
Grand River School	89	22	51.0	1.38	
Greenwood	90	24	54.0	4.33	
Hermosa	89	18	51.0	0.89	
Highmore	90	19	50.5	2.30	1.0
Hotch City	90	19	52.6	4.61	4.0
Howell	90	17	49.1	2.44	
Howard	.....	.....	.....	1.40	
Ipswich	90	18	48.2	4.17	2.0
Kidder	80	21	48.0	2.10	
Kimball	90	22	51.0	2.57	
Leola	88	22	47.7	4.78	2.0
Marion	90	24	51.5	1.17	
Menno	89	25	51.2	1.76	
Millbank	82	24	47.2	2.72	
Mitchell	91	23	51.3	2.84	
Oelrichs	88	22	49.0	2.90	
Pine Ridge	87	15	49.6	2.97	
Ramsey	91	20	49.5	1.67	
Redfield	89	19	48.0	2.77	
Rosebud Agency	92	18	50.2	2.84	5.0
Roslyn	.....	.....	.....	2.46	T.
Sioux Falls	89	24	51.6	1.56	
Spearfish	85	22	49.3	2.67	
Stephan	90	19	49.6	2.16	T.
Tyndall	91	25	52.2	2.80	
Vermillion	90[c]	27[d]	52.1[d]	1.99	
Watertown	82	21	46.8	2.12	
Wentworth	92	24	49.8	1.92	
Whitehorse	85	18	50.4	1.47	T.
Woolsey	.....	.....	.....	2.33	
Tennessee.					
Andersonville	87	32	59.4	1.80	
Arlington	89	30	61.6	1.71	
Ashwood	81	29	60.0	3.49	
Benton	88	28	61.1	2.29	
Bluff City	.....	.....	.....	2.78	
Bolivar	88	29	61.6	1.00	
Brownsville	86	30	62.4	1.72	
Byrdstown	87	29	60.0	2.00	
Carthage	92	30	62.2	2.73	
Catlettsburg	.....	.....	.....	2.66	
Cedar Hill	91	28	63.2	3.02	
Celina	.....	.....	.....	2.55	
Charleston	.....	.....	.....	3.62	
Clarksville	87	30	61.3	2.19	
Clinton	.....	.....	.....	1.95	
Covington	86	29	62.2	2.17	
Dandridge	.....	.....	.....	2.34	
Decatur	88	28	60.4	2.83	
Dickson	87	25	60.8	3.75	
Dover	91	26	62.8	2.53	
Dyersburg	86	23	63.0	2.77	
Elizabethton	85	25	56.7	1.22	
Erasmus	84	25	56.0	3.36	
Florence	85	30	60.7	2.80	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Tennessee—Cont'd.					
Franklin	87	29	61.3	5.47	
Greeneville	83	27	58.6	3.08	
Halls Hill	......	......	......	3.32	
Harriman	86	32	60.2	2.83	
Hohenwald	88	22	59.1	3.42	
Iron City	88	29	60.8	3.52	
Jackson	90	31	64.6	1.39	
Johnsonville	90	28	61.6	3.73	
Jonesboro	88	24	56.3	2.08	
Kenton	88	30	62.9	2.48	
Kingston	......	......	......	2.11	
Lafayette	89	25	60.2	4.88	
Leadvale	......	......	......	1.70	
Lewisburg	89	28	62.0	2.07	
Loudon	......	......	......	1.65	
Lynnville	84	31	60.2	1.64	
McGee	......	......	......	2.70	
McMinnville	89	28	60.8	1.95	
Maryville	89	30	61.4	2.20	
Milan	88	29	62.6	2.07	
Monterey	86	24	60.2	3.69	
Newport	87	30	58.8	2.25	
Palmetto	90	28	62.3	2.21	
Pope	92	27	61.8	2.45	
Rogersville	88	26	58.8	2.30	
Rugby	88	23	57.4	3.35	
Savannah	87	30	62.6	0.53	
Sevierville	88	27	60.1	2.46	
Sewanee	83	28	60.4	2.22	
Silver Lake	78	23	54.0	3.54	
Sparta	88	32	59.8	2.46	
Springdale	86	24	56.8	2.68	
Springville	89	26	61.0	1.49	
Tazewell	......	......	......	3.32	
Tellico Plains	87	28	60.3	2.34	
Tracy City	82	27	57.5	2.04	
Trenton	87	27	61.6	3.72	
Tullahoma	90	29	61.2	1.87	
Union City	88	29	61.8	1.89	
Walling	......	......	......	3.50	
Waynesboro	87	29	61.1	2.33	
Wildersville	85	29	61.8	2.88	
Yukon	87	31	63.2	1.59	
Texas.					
Albany	91	38	65.6	3.50	
Alvin	......	......	......	0.51	
Arthur	......	......	......	4.28	
Austin	84	50	69.8	1.51	
Ballinger	100	42	70.2	2.64	
Beaumont	......	......	......	4.46	
Beeville	87	46	70.6	4.68	
Big Spring	88	40	64.2	2.98	
Blanco	84	38	63.3	1.91	
Boerne	87	40	63.8	2.40	
Booth	......	......	......	1.32	
Bowie	91	45	65.8	2.11	
Brazoria	85	49[d]	69.7	0.78	
Brenham	86	48	69.0	2.10	
Brighton	83	58	71.3	3.30	
Brownwood	91	44	67.3	4.41	
Channing	86	31	57.5	3.26	
Clarksville	88	42	65.5	4.04	
Claude	85	31	55.4	4.60	
Claytonville	90	33	61.0	2.81	
Coleman	86	45	66.3	3.29	
College	90	53	71.6	1.24	
Colorado	91	35	64.8	3.10	
Columbia	87	43	69.1	1.58	
Columbus	......	......	......	1.65	
Corsicana	89	42	66.3	2.42	
Crockett	89	43	68.6	5.48	
Cuero	89	42	71.2	2.59	
Dallas	89	41	64.9	5.40	
Danevang	91	48	71.5	0.90	
Dialville	85	44	67.0	3.63	
Denison	......	......	......	2.34	
Duval	86	46	69.2	1.81	
Eagle Pass	94	51	72.2	1.08	
Fort Brown	89	58	74.0	3.39	
Fort Clark	92	46	69.4	3.04	
Fort McIntosh	93	55	74.5	0.85	
Fort Ringgold	99	58	77.8	2.45	
Fort Stockton	96	39	59.0	1.73	
Fredericksburg	......	......	......	2.63	
Gainesville	86	40	64.1	3.28	
Georgetown	87	43	67.4	3.34	
Gonzales	......	......	......	2.80	
Graham	90	35	65.5	2.91	
Grapevine	89	43	66.6	3.68	
Greenville	81	44	62.6	4.26	
Hale Center	81	36	55.6	2.51	
Hallettsville	......	......	......	1.73	
Haskell	90	37	58.6	3.04	
Hearne	89	41	68.6	2.37	
Hempstead	......	......	......	1.35	
Henrietta	88	39	63.2	2.37	
Hewitt	......	......	......	1.89	
Hillsboro	87	42	66.6	2.18	
Texas—Cont'd.					
Hondo	93	49	69.6	2.20	
Huntsville	90	43	68.6	0.82	
Jefferson	84	40	66.2	2.43	
Junction	......	......	......	1.72	
Kaufman	88	44	68.1	2.37	
Kerrville	86	41	67.2	2.20	
Knickerbocker	91	35	66.8	4.24	
Kopperl	......	......	......	2.64	
Lampasas	88	36	65.3	2.85	
La Para	......	......	......	2.92	
Liberty	90	43	68.4	3.30	
Llano	90	43	69.3	1.11	
Longlake	......	......	......	3.37	
Longview	88	42	66.3	1.51	
Luling	86	43	69.6	2.72	
Marlin	89	45	68.3	4.68	
Menardville	......	......	......	1.26	
Mexia	86	44	66.0	2.44	
Miami	87	32	59.3	3.36	
Mobeetee	88	33	59.6	3.52	
Mount Blanco	84	35	59.1	3.3[illegible]	
Mount Pleasant	90	39	66.2	2.28	
Nacogdoches	85	39	66.6	4.26	
Nazareth	82	32	55.0	2.96	
New Braunfels	86	46	68.2	2.84	
Panter	......	......	......	2.95	
Paris	90	42	64.9	4.24	
Port Lavaca	87	51	70.4	2.13	
Quanah	89	38	64.0	5.88	
Rhineland	96	33	62.7	3.75	
Riverside	......	......	......	0.89	
Rockisland	89	35	69.0	2.12	
Rockland	......	......	......	2.69	
Rockport	80	56	68.4	3.20	
Runge	......	......	......	3.18	
Sabinal	98	45	70.0	2.05	
San Marcos	89	43	68.2	1.45	
San Saba	89	36	66.7	1.88	
Santa Gertrude	......	......	......	2.75	
Seymour	91	37	63.8	2.90	
Sherman	89	48	67.0	3.25	
Sonora	92	33	64.2	2.30	
Sugarland	85	44	70.0	2.18	
Sulphur Springs	87	43	66.1	3.68	
Temple	86	44	66.5	4.09	
Texline	......	......	......	1.43	2.0
Trinity	90	39	69.0	1.84	
Tyler	87	42	66.6	2.70	
Valley Junction	......	......	......	1.92	
Victoria	87	47	70.3	2.88	
Waco	90	43	68.9	3.46	
Waxahachie	90	40	65.5	1.67	
Weatherford	89	43	65.4	3.18	
Wichita Falls	......	......	......	3.30	
Willspoint	86	42	65.4	3.14	
Utah.					
Alpine	......	......	......	3.07	
Aneth	82	27	55.7	0.55	
Beaver	74	17	42.6	1.62	
Black Rock	......	......	......	3.31	16.0
Black Smith Fork	......	......	......	1.39	1.5
Castledale	76	12	42.8	2.71	
Castle Rock	......	......	......	1.38	8.0
Cedar City	72	26	48.6	1.77	3.0
Corinne	83	28	50.2	2.83	5.0
Coyoto	74	8	41.0	2.00	2.5
Deseret	80	21	48.7	1.63	
Emery	74	20	45.2	2.07	
Experiment Farm	......	......	......	0.97	
Fillmore	82	20	48.2	4.38	
Fort Duchesne	80	24	49.0	0.37	0.5
Garrison	79	22	47.7	1.58	
Giles	88	31	54.8	1.22	
Government Creek	73	15	45.1	3.63	16.0
Grayson	88[m]	26	52.4[g]	1.69	4.0
Green River	85	29	55.8	3.50	
Heber	76	20	45.7	1.23	
Henefer	76	19	44.6	1.32	4.0
Hite	87	35	59.2	0.39	
Huntsville	......	......	......	2.17	5.0
Ibapah	77	17	44.4	1.02	3.2
Indianola	......	......	......	0.24	
Kanab	......	......	......	0.30	
Kelton	60	20	41.3	0.54	4.0
Levan	76	18	45.3	3.77	11.2
Logan	78[d]	23	49.2[e]	2.47	
Lucin	78	20	45.8	0.20	2.0
Manti	77	22	46.5	3.37	
Marion	......	......	......	1.79	10.0
Marysvale	77	22	45.0	1.47	1.2
Meadowville	73	14	39.8	1.75	6.0
Millville	......	......	......	2.74	
Moab	85	27	53.6	1.72	
Morgan	77	19	45.5	1.82	
Mount Nebo	78	26	48.4	2.26	
Nephi	......	......	......	3.76	16.0
Oak City	85	18	48.6	3.28	15.0
Ogden	78	27	50.0	2.67	6.5
Utah—Cont'd.					
Panquitch	......	......	......	1.71	
Parowan	76	18	43.8	1.95	10.0
Payson	......	......	......	4.57	9.0
Pinto	71	19	42.8	2.15	
Plateau	71	20	42.0	2.40	17.9
Provo	90	27	53.0	3.18	10.0
Ranch	69	5	41.0	2.55	
Randolph	......	......	......	1.21	3.0
Richfield	79	24	48.2	1.24	
Rockville	89	29	58.1	1.38	
St. George	94	26	58.0	0.90	
Salt Air	79	29	48.0	3.57	
San Juan	......	......	......	2.31	
Scipio	79	19	46.2	3.07	T.
Snowville	78	20	44.2	1.51	
Soldier Summit	66	18	39.0	0.24	
Strawberry Valley [h]	63	0	34.8	......	
Sunnyside	......	......	......	4.30	35.0
Theodore	78[f]	22[f]	48.8[f]	0.47	0.5
Thistle	79	20	50.2	......	......
Tooele	79	23	48.0	3.17	
Tropic	72	21	45.0	1.95	10.0
Trout Creek	78	20	47.8	1.18	
Vernal	77	27	48.0	1.52	
Utah Lake	75	32	49.8	2.10	6.0
Wellington	78[g]	25[g]	47.8[g]	0.70	7.0
Woodruff	70	28	47.2	1.60	14.0
Vermont.					
Cavendish	78[f]	15[g]	42.8[g]	1.36	8.0
Chelsea	65	13	38.0	1.11	8.0
Cornwall	71	20	43.5	0.95	4.0
Enosburg Falls	70	14	40.6	2.09	5.7
Jacksonville	72	13	41.0	3.44	9.0
Manchester	67	17	41.8	3.48	8.0
Norwich	70	12	40.4	2.07	6.0
St. Johnsbury	71	9	41.3	0.54	2.5
Wells	68	17	41.0	2.12	3.0
Westfield	......	......	......	1.36	7.0
Woodstock	68	16	41.8	0.96	
Virginia.					
Arvonia	94	24	57.0	2.57	
Ashland	88	28	56.4	2.31	
Barboursville	87	28	57.6	3.52	
Bigstone Gap	85	27	57.4	4.22	
Blacksburg	82	23	52.0	1.73	T.
Bristol	86	27	56.8	2.55	
Buchanan	......	......	......	1.19	
Burkes Garden	76	20	53.0	2.29	
Callaville	88	29	60.4	3.06	
Charlottesville	89	28	58.8	3.11	
Clarksville	......	......	......	2.66	
Columbia	91	28	56.4	1.56	
Dale Enterprise	84	27	54.7	2.11	
Danville	......	......	......	2.20	
Dinwiddie	88	22	56.8	3.33	
Doswell	91	25	56.9	2.56	
Elk Knob	81	28	58.0	2.73	
Farmville	90	30	54.0	1.33	
Fredericksburg	88	26	56.4	2.93	
Grahams Forge	82	24	53.8	......	T.
Hampton	84	32	57.8	1.38	
Hot Springs	79	24	51.6	3.24	
Ivanhoe	......	......	......	1.51	
Lexington	87	26	55.2	1.83	
Lincoln	90	22	54.6	3.35	
Marion	79	24	54.0	2.70	
Mendota	......	......	......	2.84	
Milford	91	27	57.2	2.57	
Newport News	85	32	58.6	1.41	
Nokesville (near)	88	29	56.6	1.33	
Petersburg	87	21	54.8	3.29	
Quantico	91	25	56.2	1.88	
Radford	......	......	......	1.56	
Randolph	......	......	......	1.59	
Riverton	......	......	......	1.65	
Rockymount	90	29	59.0	1.56	
Shenandoah	......	......	......	3.76	
Skyland	......	......	......	4.63	
Speers Ferry	......	......	......	3.18	
Spottsville	85	21	57.2	2.74	
Staunton	85	27	55.1	2.38	
Stephens City	88	26	54.8	2.31	
Warsaw	85	23	55.1	......	
Williamsburg	88	29	56.4	2.85	
Woodstock	87	24	55.6	1.75	
Washington.					
Aberdeen	87	28	52.0	2.94	
Anacortes	66	33	50.6	0.47	
Ashford	......	......	......	1.71	T.
Baker	81	30	54.4	1.10	
Bellingham	69	29	52.0	1.15	
Blaine	68	31	50.2	0.48	
Brinnon	75	31	51.6	1.59	
Cedonia	85	25	52.4	0.19	
Centralia	84	28	52.8	0.88	
Cheney	85	22	48.9	0.43	
Clearbrook	81	27	50.3	1.62	
Clearwater	87	28	50.7	2.72	

TABLE II.—*Climatological record of cooperative observers*—Continued. *Late reports for March, 1906.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Washington—Cont'd.					
Cle Elum	80	18	48.1	0.12	
Colville	90	21	52.0	0.02	
Conconully	80	24	50.8	0.32	
Coupeville	73	36	51.3	0.42	
Crescent	78	25	49.4	0.09	
Cusick	85	23	49.0	0.20	
Danville	84	23	52.0	0.34	
Dayton	89	27	54.1	0.50	......
Easton	......	......	......	0.24	0.2
East Sound	70	26	49.4	0.57	
Ellensburg	84	20	51.5	0.00	
Ephrata	87	32	57.0	0.15	
Fort Simcoe	84	32	56.5	0.05	
Goldendale	83	25	51.2	0.18	
Grandmound	80[c]	22[c]	50.4[c]	1.14	
Granite Falls	......	......	......	1.88	
Hatton	90	22	55.4	0.06	
Horse Heaven	......	......	......	0.80	
Ilwaco	89	34	51.7	2.93	
Kennewick	91	29	57.8	T.	
Kiona	89	26	56.6	0.04	
Kosmos	89	28	54.4	1.44	
Lacenter	87	28	52.0	2.03	
Lakeside	82	30	55.2	0.05	
Lester	81	26	50.3	0.98	
Lind	88	28	54.4	0.07	
Loomis	81	29	57.0	0.15	
Lucerne	......	......	......	0.01	
Merritt	......	......	......	0.48	
Mottinger Ranch	93	32	60.4	0.12	
Mount Pleasant	82	22	52.4	2.47	
Moxee	87	24	53.7	0.00	
Northport	82	19[d]	48.4[d]	0.45	
Odessa	89	23	54.6	T.	
Olga	68	30	51.2	0.75	
Olympia	80	26	51.1	1.41	
Pinehill	87	28	54.6	0.33	
Pomeroy	91	26	54.4	0.55	
Port Townsend	71	36	51.6	0.39	
Pullman	86	28	52.9	0.42	
Rattlesnake	79	26	52.6	0.12	
Republic	81	20	48.2	0.48	
Rex Creek	79	34	54.4	0.10	
Ritzville	......	......	......	0.20	
Rock Lake	......	......	......	0.20	
Rosalia	85	26	50.4	0.41	
Sedro	74	31	51.8	1.07	
Snohomish	79	28	52.8	1.06	
Snoqualmie	85	29	53.0	1.92	
Sunnyside	84	30	54.6	0.11	
Tekoa	......	......	......	0.44	
Touchet	90	28	56.8	T.	
Trinidad	88	30	58.6	0.00	
Twisp	86	25	52.0	0.01	
Union	82	26	51.8	1.64	
Vancouver	90	31	55.1	1.63	
Vashon	71	33	52.0	0.83	
Wahluke	89	31	57.4	0.00	
Waterville	80	26	51.0	0.00	
Wenatchee (near)	79	30	52.8	0.09	
Wilbur	80	24	50.1	0.07	
Winthrop	68	8	39.8	0.51	5.0
Wynooche	83	25	51.0	1.71	
Yale	89	27	55.4	2.16	
Zindel	95	33	59.1	0.44	
West Virginia.					
Bancroft	89	17	56.2	1.38	
Bayard	77	15	48.0	4.98	3.0
Bens Run	88	24	54.6	3.62	
Berkley Springs	85	24	56.1	2.32	
Bluefield	82	28	56.3	3.80	
Buckhannon	81	22	51.8	5.00	T.
Burlington	83	21	52.8	1.50	T.
Cairo	92	22	56.0	3.44	
Central	87	20	52.6	3.18	T.
Charleston	86	29	57.9	2.12	
Creston	86	23	53.2	2.50	
Cuba	87	24	54.5	1.78	
Doane	90	25	59.6	1.75	
Durbin	78	21	48.6	......	
Elkhorn	83	26	56.2	0.57	T.
Fairmont	86	19	53.1	5.22	
Franklin	81	21	54.0	2.49	T.
Glenville	88	24	56.0	3.39	
Grafton	83	22	53.0	5.05	0.5
Green Sulphur Springs	80	21	53.2	2.51	
Hinton	84[g]	29[g]	57.2[g]	3.07	
Huntington	90	26	57.5	2.26	
Leonard	76	24	51.2	4.73	
Lewisburg	83	23	53.0	2.60	T.
Logan	89	28	59.5	2.60	
Lost City	80	24	51.7	3.60	T.
Lost Creek	84	21	53.8	5.21	T.
Madison	90	26	57.0	2.26	
Mannington	86	22	54.0	4.52	
Martinsburg	86	27	53.1	2.35	
Moorefield	82	20	53.6	3.05	T.
Mooresville	......	......	......	3.41	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
West Virginia—Cont'd.					
Morgantown	83	21	53.6	4.10	T.
Moundsville	86	23	54.4	3.41	T.
New Cumberland	80	23	50.4	2.10	T.
New Martinsville	88	25	55.4	3.46	
Nuttallburg	70	26	48.7	1.95	
Oceana	90	25	58.2	2.93	T.
Parsons	83	18	50.0	5.41	2.0
Philippi	84	20	52.6	6.16	0.2
Pickens	79	19	48.3	5.39	2.0
Point Pleasant	89	28	59.0	1.36	
Powellton	88	27	57.8	2.63	
Princeton	77	20	50.6	4.25	T.
Romney	84	25	56.0	1.75	T.
Rowlesburg	......	......	......	6.40	
Ryan	89	23	55.0	2.08	
Smithfield	85	21	53.1	3.79	
Southside	88	25	57.0	2.67	
Spencer	89	20	52.2	1.20	
Sutton	92	28	55.8	4.24	
Terra Alta	77	16	48.8	6.59	
Union	82	35	57.8	1.78	
Uppertract	83	20	54.0	2.85	T.
Valley Fork	88	22	57.3	2.51	
Webster Springs	88	24	55.6	3.50	2.0
Wellsburg	79	23	51.3	2.21	
Weston	86	22	52.2	4.42	0.6
Wheeling	......	......	......	2.38	
Williamson	88	21	57.2	0.95	
Wisconsin.					
Amherst	77	18	34.4	1.69	
Antigo	75	18	46.0	0.15	1.5
Appleton	76	17	47.0	2.01	3.0
Appleton Marsh	80	19	48.6	1.57	T.
Ashland	76	22	44.8	2.12	T.
Barron	78	20	47.0	2.58	T.
Beloit	78	24	49.2	1.42	
Berlin	81	22	47.8	1.12	
Black River Falls	......	......	......	1.00	
Brodhead	83	22	51.0	1.42	T.
Burnett	79	25	47.3	1.41	1.0
Butternut	81	12	45.0	2.26	
Chilton	73	24	47.0	1.32	2.0
Chippewa Falls	......	......	......	1.38	
Downing	80	20	47.8	2.25	T.
Eau Claire	76	22	49.8	1.52	
Florence	71	19	43.2	......	T.
Fond du Lac	78	20	46.8	1.99	4.0
Grand Rapids	75	18	48.1	1.40	......
Grand River Locks	......	......	......	1.35	2.0
Grantsburg	76	24	47.4	3.56	
Hancock	77	18	47.5	2.74	3.0
Harvey	82	26	48.8	1.53	0.5
Hayward	82	15	46.1	1.15	T.
Hillsboro	78	17	48.6	1.83	2.5
Koepenick	86	10	46.3	1.80	
Lancaster	81	23	51.8	1.23	1.0
Manitowoc	70	26	44.0	1.96	1.5
Mauston	80	22	50.1	1.54	1.0
Meadow Valley	80	19	48.4	1.59	
Medford	80	20	47.0	1.67	
Menasha	......	......	......	1.46	2.5
Merrill	75	18	45.9	1.92	T.
Minocqua	75	9	42.0	0.75	2.0
Mount Horeb	80	20	49.3	1.63	2.0
Neillsville	82	18	47.0	0.99	
New London	76	23	48.2	1.88	
New Richmond	82	24	49.3	2.28	T.
Oconto	72	25	45.7	2.25	
Osceola	80	21	48.8	1.55	T.
Oshkosh	71	21	47.4	2.58	1.0
Pine River	75	20	48.0	1.99	3.1
Portage	80	22	50.2	0.92	2.0
Port Washington	71	27	44.8	1.40	0.5
Prairie du Chien	84	22	52.1	1.15	2.0
Prentice	82	15	46.6	1.41	T.
Racine	73	26	46.6	1.61	
Sheboygan	72	26	46.0	1.36	1.0
Shullsburg	82	18	50.8	1.40	0.9
Stanley	77	20	47.8	2.07	T.
Stevens Point	75[e]	19[e]	46.6[d]	2.02	
Sturgeon Bay	78	24	43.9	2.21	
Valley Junction	68	20	45.4	1.30	1.0
Viroqua	76	24	51.0	0.86	1.0
Watertown	81	20	47.7	1.61	T.
Waukesha	......	......	......	1.69	T.
Waupaca	78	19	47.6	1.89	
Wausau	75	20	47.4	1.57	T.
Whitehall	81	20	49.5	1.77	
Wyoming.					
Afton	69	6	38.2	1.83	8.0
Alcova	82	20	46.3	1.64	2.0
Barnum	......	......	......	1.41	12.0
Bedford	66	5	36.6	1.25	
Border	72	7	39.2	0.77	
Buffalo	80	13	43.7	0.50	1.0
Cambria	83	12	47.1	0.86	
Chugwater	79	15	45.4	2.33	2.5
Clark	82	19	49.6	0.62	T.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Wyoming—Cont'd.					
Clear Creek Cabin	66	0	35.5	1.55	15.5
Cody	71	12	44.6	T.	T.
Daniel	61	1	30.4	0.40	4.0
Elk Mountain	......	......	......	2.00	21.2
Embar	61	20	38.8	1.03	9.0
Evanston	69	16	39.8	1.45	5.0
Experiment Farm	......	......	......	1.31	5.0
Fontenelle	69	6	37.9	......	
Fort Laramie	85	16	47.2	1.05	
Fort Washakie	75	9	45.9	0.70	
French Creek	72	1	35.8	3.21	25.0
Gillette	81	6	45.0	1.60	12.0
Granite Canyon	68	11	39.9	1.63	14.6
Granite Springs	......	......	......	3.58	
Green River	77	15	43.9	1.02	8.2
Griggs	79	8	46.1	2.00	8.2
Hatton	......	......	......	3.62	36.2
Hyattville	85	15	48.3	......	
Kirtley	79	16	44.9	1.46	
Laramie	69	10	39.8	1.75	6.4
Leo	71	11	40.5	1.30	3.0
Little Medicine	68	10	37.0	1.65	13.0
Lolabama Ranch	......	......	......	1.31	10.0
Lusk	82	12	45.0	0.30	
Moorcroft	86	−10	46.9	1.67	9.0
Moore	76	15	45.5	1.76	4.0
Pathfinder	76	19	46.0	1.50	1.5
Phillips	81	12	47.2	3.04	
Pine Bluff	77	19	46.5	2.86	
Pinedale	69	−1	33.6	0.65	7.0
Rambler	54	8	31.6	2.12	......
Rawlins	72	15	41.6	1.06	T.
Saratoga	76	16	42.3	1.38	6.9
Shoshone Canyon	78	12	46.4	0.70	3.0
South Pass City	69	6	35.0	2.60	26.0
Thayne	71	5	37.0	1.27	3.9
Thermopolis	70	8	42.8	2.45	8.0
Wells	56	−5	31.4	1.37	15.0
Wheatland	84	22	52.0	1.20	4.0
Wolf	79	20	48.2	0.31	T.
Yellowstone Pk. (Fount)[d]	62	−2	34.8		
Yellowstone Pk. (G. Can.)	62	−10	31.6	0.36	
Yellowstone Pk. (Lake)	59	−8	32.0	1.64	15.0
Yellowstone Pk. (Norris)	66	−8	33.6	......	
Yellowstone Pk (Riv'side)	67	−8	34.2	1.32	10.0
Yellowstone Pk (Snake R)	68	−2	36.0	0.50	5.0
Yellowstone Pk. (Soda B.)	68	−5	35.5	1.57	6.5
Yellowstone Pk. (Thumb)	59	−7	29.2	1.47	22.5
Yellowstone Pk. (Up. B.)	63	−7	33.8	2.62	12.5
Porto Rico.					
Adjuntas	88	49	68.6	2.35	
Aguas Buenas	......	......	......	2.20	
Aguirre	92	65	78.9	0.30	
Aibonita	82	56	69.2	1.85	
Anasco	93	64	77.2	1.97	
Arecibo	91	57	73.0	8.38	
Barros	86	58	71.0	......	
Bayamon	93	60	75.2	9.24	
Caguas	94	57	75.2	1.26	
Canovanas	92	69	78.2	4.04	
Cayey	85	68	76.4	2.62	
Cidra	89	57	73.2	2.43	
Coamo	92	71	81.2	0.74	
Coloso	89	62	75.4	3.69	
Carozal	91	52	75.4	3.78	
Fajardo	90	67	77.8	1.95	
Guanica	91	58	75.9	2.20	
Hacienda Josefa	......	......	......	0.03	
Humacao	86	62	75.8	3.59	
Juana Diaz	92	61	78.8	1.30	
La Ysolina	90	57	72.0	6.32	
Lares	93	57	75.0	3.54	
Las Cruces	85	53	69.4	3.22	
Las Marias	89	60	74.3	2.68	
Manati	95	62	76.6	5.02	
Maunabo	93	66	79.4	1.20	
Mayaguez	93	60	76.8	3.35	
Morovis	94	58	76.0	3.00	
Ponce[d]	90	61	77.6	......	
Rio Blanco	90	60	76.3	3.97	
Rio Piedras	......	......	......	8.52	
San German	90	60	74.0	8.39	
San Lorenzo	93	57	76.4	2.84	
San Salvador	86	57	71.3	3.00	
Yauco	88	61[d]	76.4[b]	1.57	
New Brunswick.					
St. John	56	19	37.7	4.08	6.2
West Indies.					
Basseterre, St. Kitts	84	69	77.0	3.86	
Hamilton, Ber.	79	46	64.5	......	

Late reports for March, 1906.

Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.	°	°	°	Ins.	Ins.
Central	......	......	......	0.05	1.4
Coal Harbor	48	0	31.2	6.46	4.2

TABLE II.—*Climatological record of cooperative observers. Late reports for March, 1906*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alaska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fort Egbert	51	—11	28.4	2.19	11.0
Kenai	48	1	26.5	1.24	10.2
Summit	40	— 3	22.0	1.04	12.0
Udakta	50	7	31.9	12.19	
Arizona.					
Alpine	......	......	......	2.24	14.4
Parker	91	29	59.8	0.89	
California.					
Bakersfield	81	26	55.4	1.70	
Imperial	103	36	62.2	0.35	
San Miguel Island	......	......	......	9.07	
Sneddens Ranch	......	......	......	8.50	
Tejon	77	31	54.2	4.37	
Upper Lake	80	29	50.0	5.94	
Weldon	......	......	......	4.24	
Colorado.					
Canon City	72	— 1	36.5	3.28	8.0
Gleneyre	67	—13	28.6	2.69	16.0
Grand Valley	69	— 5	39.8	3.57	18.0
Idaho Springs	62	—17	29.9	2.50	19.0
Lake Moraine	43	— 7	23.0	3.04	38.0
Florida.					
Plant City	90	35	65.4	2.61	
Illinois.					
Philo	54	—13	29.1	4.38	24.0
Iowa.					
Iowa City	54	3	27.4	2.25	6.7
Maine.					
Oquossoc	49	—19	16.8	2.14	25.5
Minnesota.	°	°	°	*Ins.*	*Ins.*
Beaulieu	53	—25	17.0	0.30	6.0
Nebraska.					
West Point	68	— 5	29.8	1.05	7.5
New Hampshire.					
Jefferson Highland	......	......	......	1.40	14.0
New Mexico.					
Rociada	......	......	......	0.87	......
Ohio.					
Nellie	60	— 2	30.6	3.81	28.0
South Dakota.					
Whitehorse	62	—25	22.0	0.45	4.5
Texas.					
Waco	90	27	57.0	2.95	
Utah.					
Farmington	60	15	38.6	......	25.8
West Virginia.					
Durbin	58	8	32.3	2.92	26.5
Valley Fork	70	8	38.8	5.74	8.8
Wisconsin.					
Medford	......	......	......	0.50	
Wyoming.					
Alcova	65	—21	25.2	1.99	14.3
Basin	62	—42	17.8	0.82	8.0
Fort Laramie	......	......	......	1.87	22.7
Lusk	68	—23	21.9	2.70	24.0
Thermopolis	58	—28	19.8	2.95	24.5
Yellowstone Park, Lake	48	—39	18.6	2.69	26.0
Yellowstone Park, Thumb	53	—47	14.4	4.45	44.0
Nicaragua.					
Bluefields	89	72	81.0	2.30	

EXPLANATION OF SIGNS.

• Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks of whatever duration, in the precipitation record receive appropriate notice.

TABLE III.—*Wind resultants, from observations at 8 a. m. and 8 p. m., daily, during the month of April, 1906.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
	Hours.	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
New England.						
Eastport, Me	25	20	11	15	n. 39 w.	6
Portland, Me	25	19	6	22	n. 69 w.	17
Concord, N. H. †	18	2	9	9	n.	16
Northfield, Vt	24	26	4	18	s. 82 w.	14
Boston, Mass	23	19	11	23	n. 72 w.	13
Nantucket, Mass	19	23	11	20	s. 66 w.	10
Block Island, R. I	17	23	11	27	s. 69 w.	17
Providence, R. I	21	17	13	24	n. 70 w.	12
Hartford, Conn	32	15	7	22	n. 42 w.	23
New Haven, Conn	26	15	10	22	n. 47 w.	16
Middle Atlantic States.						
Albany, N. Y	28	15	4	25	n. 59 w.	25
Binghamton, N. Y.†	15	3	6	13	n. 30 w.	14
New York, N. Y	24	15	11	25	n. 57 w.	17
Harrisburg, Pa	24	11	14	28	n. 47 w.	19
Philadelphia, Pa	29	17	6	23	n. 55 w.	21
Scranton, Pa	30	9	14	19	n. 13 w.	22
Atlantic City, N. J	22	21	8	26	n. 87 w.	18
Cape May, N. J	18	23	9	21	s. 67 w.	13
Baltimore, Md	28	12	7	27	n. 51 w.	26
Washington, D. C	23	15	11	26	n. 62 w.	17
Cape Henry, Va.*	3	18	8	6	s. 8 e.	15
Lynchburg, Va	20	17	14	26	n. 76 w.	12
Mount Weather, Va	29	11	8	32	n. 53 w.	30
Norfolk, Va	18	29	11	14	s. 15 w.	11
Richmond, Va	18	24	13	17	s. 34 w.	7
Wytheville, Va	17	11	4	42	n. 81 w.	38
South Atlantic States.						
Asheville, N. C	29	12	12	23	n. 33 w.	20
Charlotte, N. C	15	26	12	22	s. 42 w.	15
Hatteras, N. C	......	......	......	......	......	......
Raleigh, N. C	16	21	6	31	s. 79 w.	26
Wilmington, N. C	14	22	10	28	s. 69 w.	19
Charleston, S. C	12	25	16	20	s. 17 w.	14
Columbia, S. C	18	23	12	19	s. 54 w.	9
Augusta, Ga	18	21	11	26	s. 79 w.	15
Savannah, Ga	12	26	15	23	s. 30 w.	16
Jacksonville, Fla	17	23	21	14	s. 49 e.	9
Florida Peninsula.						
Jupiter, Fla	12	26	22	13	s. 33 e.	17
Key West, Fla	18	10	38	2	n. 77 e.	37
Sand Key, Fla. †	12	5	18	1	n. 68 e.	18
Tampa, Fla	27	5	24	18	n. 15 e.	23
Eastern Gulf States.						
Atlanta, Ga	12	17	15	28	s. 69 w.	14
Macon, Ga.†	12	10	7	12	n. 68 w.	5
Thomasville, Ga †	9	8	7	10	n. 72 w.	3
Pensacola, Fla.†	12	9	10	6	n. 53 e.	5
Anniston, Ala	17	24	18	12	s. 41 e.	9
Birmingham, Ala.†	9	8	10	10	n.	1
Mobile, Ala	22	29	10	17	s. 45 w.	10
Montgomery, Ala	12	26	15	15	s.	14
Meridian, Miss.†	10	13	7	8	s. 18 w.	3
Vicksburg, Miss	9	29	19	14	s. 14 e.	21
New Orleans, La	17	25	26	4	s. 70 e.	23
Western Gulf States.						
Shreveport, La	11	28	25	18	s. 22 e.	18
Fort Smith, Ark	6	18	26	16	s. 40 e.	16
Little Rock, Ark	11	25	21	15	s. 23 e.	15
Corpus Christi, Tex	6	23	41	3	s. 66 e.	42
Fort Worth, Tex	14	30	17	14	s. 11 e.	16
Galveston, Tex	9	27	36	8	s. 57 e.	33
Palestine, Tex	16	30	21	6	s. 47 e.	20
San Antonio, Tex	16	18	40	3	s. 87 e.	37
Taylor, Tex. †	10	15	10	0	s. 63 e.	11
Ohio Valley and Tennessee.						
Chattanooga, Tenn	19	17	9	25	s. 83 w.	16
Knoxville, Tenn	19	18	10	27	n. 87 w.	17
Memphis, Tenn	13	29	19	18	s. 3 e.	16
Nashville, Tenn	19	20	13	20	s. 82 w.	7
Lexington, Ky. †	4	13	7	11	s. 24 w.	10
Louisville, Ky	14	23	11	23	s. 53 w.	15
Evansville, Ind.†	9	11	8	9	s. 27 w.	2
Indianapolis, Ind	18	20	14	20	s. 72 w.	6
Cincinnati, Ohio	21	15	14	24	n. 59 w.	12
Columbus, Ohio	19	13	17	28	n. 66 w.	12
Pittsburg, Pa	30	12	6	31	n. 54 w.	31
Parkersburg, W. Va	26	18	10	19	n. 48 w.	12
Elkins, W. Va	24	17	11	21	n. 55 w.	12
Lower Lake Region.						
Buffalo, N. Y	13	25	7	30	s. 62 w.	26
Oswego, N. Y	17	16	8	28	n. 87 w.	20
Rochester, N. Y	15	17	9	35	s. 86 w.	26
Syracuse, N. Y	18	14	11	30	n. 78 w.	19
Erie, Pa	10	16	2	39	s. 81 w.	38
Cleveland, Ohio	16	18	13	21	s. 76 w.	8
Sandusky, Ohio †	3	10	6	17	s. 58 w.	13
Toledo, Ohio	11	18	12	22	s. 55 w.	12
Detroit, Mich	16	15	12	29	n. 87 w.	17
Upper Lake Region.						
Alpena, Mich	20	12	15	25	n. 51 w.	13
Escanaba, Mich	22	20	14	14	n.	2
Grand Haven, Mich	14	22	14	23	s. 48 w.	12
Grand Rapids, Mich	19	13	10	27	n. 71 w.	18
Houghton, Mich.†	8	4	15	9	n. 56 e.	7
Marquette, Mich	23	14	12	26	n. 57 w.	17
Port Huron, Mich	25	18	17	16	n. 8 e.	7
Sault Ste. Marie, Mich	16	11	15	33	n. 74 w.	19
Chicago, Ill	15	21	19	18	s. 9 e.	6
Milwaukee, Wis	17	20	11	21	s. 73 w.	10
Green Bay, Wis	16	27	15	19	s. 20 w.	12
Duluth, Minn	28	10	19	20	n. 3 w.	18
North Dakota.						
Moorhead, Minn	23	21	16	16	n.	2
Bismarck, N. Dak	22	13	19	23	n. 24 w.	10
Devils Lake, N. Dak	20	19	18	17	n. 45 e.	1
Williston, N. Dak	23	19	17	17	n.	4
Upper Mississippi Valley.						
Minneapolis, Minn.*	7	11	10	10	s.	4
St. Paul, Minn	18	22	20	12	s. 63 e.	9
La Crosse, Wis.†	8	12	5	8	s. 37 w.	5
Madison, Wis	11	24	15	21	s. 25 w.	14
Charles City, Iowa	21	22	16	19	s. 72 w.	3
Davenport, Iowa	19	20	11	23	s. 85 w.	12
Des Moines, Iowa	18	22	18	19	s. 14 w.	4
Dubuque, Iowa	16	25	15	22	s. 38 w.	11
Keokuk, Iowa	13	24	20	18	s. 10 e.	11
Cairo, Ill	14	32	18	11	s. 21 e.	19
La Salle, Ill. †	8	9	10	13	s. 72 w.	3
Peoria, Ill	14	24	18	19	s. 6 w.	10
Springfield, Ill	11	23	19	21	s. 9 w.	12
Hannibal, Mo. †	8	8	11	9	e.	2
St. Louis, Mo	11	22	25	16	s. 39 e.	14
Missouri Valley.						
Columbia, Mo. *	6	10	11	9	s. 27 e.	4
Kansas City, Mo	14	27	23	15	s. 32 e.	15
Springfield, Mo	9	28	21	16	s. 15 e.	20
Iola, Kans.†	5	12	11	7	s. 30 e.	8
Topeka, Kans.*	3	13	7	9	s. 11 w.	10
Lincoln, Nebr	19	23	23	12	s. 70 e.	12
Omaha, Nebr	22	21	17	12	n. 79 e.	5
Valentine, Nebr	28	18	13	16	n. 17 w.	10
Sioux City, Iowa †	8	11	11	9	s. 34 e.	4
Pierre, S. Dak	22	21	22	14	n. 83 e.	8
Huron, S. Dak	21	21	21	13	e.	8
Yankton, S. Dak. †	7	8	11	11	s.	1
Northern Slope.						
Havre, Mont	23	9	5	33	n. 63 w.	31
Miles City, Mont	19	17	13	23	n. 79 w.	10
Helena, Mont	15	16	8	33	s. 88 w.	25
Kalispell, Mont	17	10	11	34	n. 73 w.	24
Rapid City, S. Dak	22	11	14	26	n. 47 w.	16
Cheyenne, Wyo	32	12	4	21	n. 40 w.	26
Lander, Wyo	13	28	13	23	s. 34 w.	18
Yellowstone Park, Wyo	17	27	3	28	s. 68 w.	27
North Platte, Nebr	23	18	20	18	n. 22 e.	5
Middle Slope.						
Denver, Colo	24	22	11	11	n.	2
Pueblo, Colo	26	1	18	26	n. 18 w.	26
Concordia, Kans	17	22	16	17	s. 11 w.	5
Dodge, Kans	12	24	16	20	s. 18 w.	13
Wichita, Kans	12	29	17	14	s. 10 e.	17
Oklahoma, Okla	11	37	6	17	s. 23 w.	28
Southern Slope.						
Abilene, Tex	15	32	17	10	s. 22 e.	18
Amarillo, Tex	13	28	17	17	s.	15
Del Rio, Tex †	7	9	18	3	s. 82 e.	15
Roswell, N. Mex	14	26	10	22	s. 45 w.	17
Southern Plateau.						
El Paso, Tex	17	8	23	26	n. 18 w.	10
Santa Fe, N. Mex	16	23	23	18	s. 36 e.	9
Flagstaff, Ariz	20	18	8	28	n. 84 w.	20
Phoenix, Ariz	10	10	25	25	......	......
Yuma, Ariz	13	20	13	26	s. 62 w.	15
Independence, Cal	27	13	12	23	n. 38 w.	18
Middle Plateau.						
Reno, Nev	14	12	11	35	n. 85 w.	24
Winnemucca, Nev	26	11	25	19	n. 22 e.	16
Modena, Utah	13	13	16	30	w.	14
Salt Lake City, Utah	21	16	19	20	n. 11 w.	5
Durango, Colo	21	14	8	29	n. 72 w.	22
Grand Junction, Colo	19	13	24	16	n. 53 e.	10
Northern Plateau.						
Baker City, Oreg	20	30	13	12	s. 6 e.	10
Boise, Idaho	19	18	16	21	n. 79 w.	5
Lewiston, Idaho †	2	3	19	6	s. 86 e.	13
Pocatello, Idaho	7	26	17	25	s. 23 w.	21
Spokane, Wash	14	22	15	22	s. 41 w.	11
Walla Walla, Wash	15	26	16	13	s. 15 w.	11
North Pacific Coast Region.						
North Head, Wash	20	18	13	24	n. 80 w.	11
Port Crescent, Wash.*	12	5	6	17	n. 58 w.	13
Seattle, Wash	20	18	15	18	n. 56 w.	4
Tacoma, Wash	25	15	4	22	n. 61 w.	21
Tatoosh Island, Wash	2	17	21	26	s. 18 w.	16
Portland, Oreg	22	19	8	31	n. 83 w.	23
Roseburg, Oreg	30	11	10	24	n. 36 w.	24
Middle Pacific Coast Region.						
Eureka, Cal	28	15	9	20	n. 40 w.	17
Mount Tamalpais, Cal	23	11	7	33	n. 65 w.	29
Point Reyes Light, Cal. †	21	2	1	17	n. 40 w.	25
Red Bluff, Cal	20	23	14	16	s. 34 w.	4
Sacramento, Cal	14	32	19	10	s. 27 e.	20
San Francisco, Cal	9	9	3	43	w.	40
San Jose, Cal. †	......	......	......	......	......	......
Southeast Farallon, Cal	11	4	0	23	n. 73 w.	24
South Pacific Coast Region.						
Fresno, Cal	43	4	7	18	n. 16 w.	40
Los Angeles, Cal	17	8	20	25	n. 29 w.	10
San Diego, Cal	26	8	14	28	n. 38 w.	23
San Luis Obispo, Cal	37	6	2	23	n. 34 w.	37
West Indies						
Grand Turk, W.I. †	6	5	24	1	n. 88 e.	23
Hamilton, Bermuda	23	16	6	31	n. 74 w.	26
San Juan, Porto Rico	10	15	46	2	s. 84 e.	44

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour, during April, 1906, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y	14-15			1.01														*			
Alpena, Mich	8-9			0.90														0.17			
Amarillo, Tex	3-4			1.33														0.26			
Asheville, N. C	13-14			1.44														0.38			
Atlanta, Ga	9	10:00 a. m.	12:05 p. m.	0.58	11:15 a. m.	11:25 a. m.	0.22	0.05	0.30												
Atlantic City, N. J	9			1.24														0.26			
Augusta, Ga	27-28			0.50														0.33			
Baltimore, Md	8-9			2.00														0.32			
Binghamton, N. Y	14-15			0.77														0.30			
Birmingham, Ala	9			0.68														0.46			
Bismarck, N. Dak	25-26			0.46														0.12			
Block Island, R. I	9-10			1.23														0.25			
Boise, Idaho	1			0.76														*			
Boston, Mass	15			0.43														0.23			
Buffalo, N. Y	9-10			0.78														0.19			
Cairo, Ill	30	10:15 a. m.	12:40 p. m.	0.67	11:02 a. m.	11:17 a. m.	0.01	0.21	0.48	0.55											
Charles City, Iowa	28			0.26														0.12			
Charleston, S. C	14-15	9:05 p. m.	6:00 a. m.	0.84	9:08 p. m.	9:23 p. m.	T.	0.34	0.44	0.50											
Charlotte, N. C	14			0.57														0.34			
Chattanooga, Tenn	9	3:34 a. m.	7:42 a. m.	1.07	5:21 a. m.	6:02 a. m.	0.05	0.11	0.18	0.24	0.30	0.45	0.50	0.57	0.73						
Cheyenne, Wyo	7			1.33														*			
Chicago, Ill	28	2:23 p. m.	3:28 p. m.	0.32	3:12 p. m.	3:22 p. m.	0.01	0.18	0.30												
Cincinnati, Ohio	5			0.43														0.14			
Cleveland, Ohio	5-6			0.45														0.14			
Columbia, Mo	12-13			0.82														0.26			
Columbia, S. C	29	12:02 p. m.	1:50 p. m.	0.82	12:12 p. m.	12:32 p. m.	0.01	0.15	0.35	0.61	0.61	0.69									
Columbus, Ohio	29			0.18														0.17			
Concord, N. H	9-10			0.65														*			
Corpus Christi, Tex	13	6:33 a. m.	9:02 a. m.	1.81	6:41 a. m.	7:56 a. m.	0.02	0.11	0.32	0.43	0.56	0.65	0.73	0.86	0.89	0.90	0.90	1.03	1.70		
Davenport, Iowa	* 28			0.46								0.35									
Denver, Colo	26-27			2.18														*			
Des Moines, Iowa	7-8			0.90														0.53			
Detroit, Mich	8-9			0.68														0.13			
Dodge, Kans	12			0.53														0.47			
Dubuque, Iowa	28			0.30														0.16			*
Duluth, Minn	8-9			0.60														*			
Eastport, Me	23-24			0.90														0.19			
Elkins, W. Va	9	4:30 p. m.	5:50 p. m.	0.47	4:46 p. m.	5:00 p. m.	0.01	0.17	0.31	0.40											
Erie, Pa	9-10			0.92														0.34			
Escanaba, Mich	14			0.36														*			
Evansville, Ind	8	7:30 p. m.	8:20 p. m.	0.66	7:35 p. m.	8:20 p. m.	T.	0.35	*	*	*	*	*	*	*	0.66					
Fort Smith, Ark	30			0.91														0.37			
Fort Worth, Tex	12	3:43 p. m.	4:40 p. m.	0.50	4:09 p. m.	4:21 p. m.	0.01	0.10	0.31	0.38											
Galveston, Tex	13			0.14														0.07			
Grand Rapids, Mich	25-26			0.28														0.15			
Green Bay, Wis	8-9			1.05														*			
Hannibal, Mo	7-8			0.95														0.23			
Harrisburg, Pa	14-15			2.00														0.57			
Hartford, Conn	9-10			1.99														0.35			
Hatteras, N. C																					
Huron, S. Dak	27-28			0.79														0.17			
Indianapolis, Ind	8			1.13														0.40			
Iola, Kans	27	4:40 p. m.	5:09 p. m.	0.37	4:59 p. m.	5:08 p. m.	0.02	0.14	0.35												
Jacksonville, Fla	14-15			0.28														0.23			
Jupiter, Fla	13			0.54														0.53			
Kansas City, Mo	27	6:01 p. m.	7:10 p. m.	0.67	6:22 p. m.	6:49 p. m.	0.02	0.09	0.22	0.36	0.43	0.51	0.61								
Key West, Fla	29			0.28														0.28			
Knoxville, Tenn	9			0.77														0.62			
La Crosse, Wis	28-29			0.24														0.09			
La Salle, Ill	8			0.45														0.14			
Lexington, Ky	14			0.61														0.29			
Lincoln, Nebr	27			0.63														0.46			
Little Rock, Ark	20-21			0.50														0.19			
Los Angeles, Cal	5			0.38														0.26			
Louisville, Ky	8			0.65														0.36			
Lynchburg, Va	14	7:30 p. m.	D. N.	1.38	8:14 p. m.	8:32 p. m.	0.30	0.21	0.34	0.47											
Macon, Ga	9			0.35														0.33			
Madison, Wis	8			0.43														0.09			
Memphis, Tenn	12-13			0.47														0.24			
Meridian, Miss	28	5:21 p. m.	6:30 p. m.	1.05	5:23 p. m.	5:38 p. m.	0.01	0.27	0.82	0.90											
Milwaukee, Wis	13	11:25 p. m.	11:55 p. m.	0.38	11:28 p. m.	11:45 p. m.	0.01	0.25	0.30	0.35											
Minneapolis, Minn	12-13			0.92														0.15			
Montgomery, Ala	14			0.59														0.54			
Mount Weather, Va	14-15	3:20 p. m.	6:45 a. m.	2.54	9:32 p. m.	10:32 p. m.	0.93	0.06	0.17	0.28	0.30	0.37	0.43	0.45	0.51	0.55	0.61	0.75			
Nantucket, Mass	9-10			1.24														0.43			
Nashville, Tenn	8-9			0.57														0.31			
New Haven, Conn	9-10			2.55														0.55			
New Orleans, La	13	2:30 p. m.	8:30 p. m.	0.92	2:44 p. m.	3:14 p. m.	0.06	0.07	0.30	0.41	0.53	0.60	0.66								
New York, N. Y	9-10			2.42														0.39			
Norfolk, Va	9-10			0.88														0.40			
Northfield, Vt	9-10			0.56														*			
North Head, Wash	23-24			0.65														0.08			
Oklahoma, Okla	29-30	9:35 p. m.	6:10 a. m.	1.45	5:02 a. m.	5:27 a. m.	0.84	0.09	0.17	0.26	0.44	0.51									
Omaha, Nebr	30	6:35 p. m.	9:30 p. m.	1.07	6:50 p. m.	7:10 p. m.	0.03	0.13	0.34	0.81	0.93										
Palestine, Tex	13	4:15 a. m.	5:45 a. m.	0.78	4:31 a. m.	4:57 a. m.	0.01	0.26	0.44	0.51	0.61	0.67	0.70								
Parkersburg, W. Va	14			0.82														0.46			
Pensacola, Fla	14	4:50 a. m.	6:15 a. m.	0.63	5:44 a. m.	6:02 a. m.	0.10	0.07	0.25	0.44	0.52										
Peoria, Ill	8	2:47 p. m.	4:00 p. m.	0.47	3:06 p. m.	3:21 p. m.	0.04	0.11	0.21	0.37											
Philadelphia, Pa	9			2.07														0.26			
Pittsburg, Pa	8-9			0.55														0.31			
Portland, Me	9-10			2.30														0.40			
Portland, Oreg	24-25			0.64														0.36			
Pueblo, Colo	12			0.64														0.31			
Raleigh, N. C	14-15			0.32														0.24			
Richmond, Va	9	9:07 p. m.	9:50 p. m.	0.42	9:17 p. m.	9:25 p. m.	0.01	0.32	0.37												
Rochester, N. Y	9-10			1.19														0.19			
Sacramento, Cal	10			0.45														0.20			
St. Louis, Mo	7-8			0.77														0.51			
St. Paul, Minn	8-9			0.89														0.12			
Salt Lake City, Utah	1			0.90														*			

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
San Antonio, Tex	13	3:30 a. m.	4:00 a. m.	0.58	3:34 a. m.	3:50 a. m.	0.01	0.09	0.40	0.55											
San Diego, Cal	5-6			0.49														0.15			
Sandusky, Ohio	14			0.57														0.22			
San Francisco, Cal	23			0.51														*			
Savannah, Ga	14	6:55 p. m.	9:30 p. m.	1.12	7:30 p. m.	7:55 p. m.	0.01	0.26	0.58	0.67	0.83	0.91									
Scranton, Pa	14-15			1.79														0.37			
Seattle, Wash	8-9			0.20														0.10			
Shreveport, La	13			0.46														0.36			
Spokane, Wash	8			0.16														0.13			
Springfield, Ill	8			0.86														0.20			
Springfield, Mo	12-13			1.04														0.39			
Syracuse, N. Y	9-10			1.19														0.19			
Tampa, Fla	12	4:34 p. m.	6:30 p. m.	0.77	4:36 p. m.	5:01 p. m.	0.02	0.09	0.17	0.31	0.45	0.53									
Taylor, Tex.	16-17			0.59														0.15			
Toledo, Ohio	13-14			0.42														0.17			
Topeka, Kans	12			0.82														0.46			
Valentine, Nebr	30			0.63														0.42			
Vicksburg, Miss	28	12:09 p. m.	4:00 p. m.	2.03	12:12 p. m.	12:57 p. m.	0.01	0.13	0.30	0.50	0.63	0.70	0.79	0.94	1.05	1.10					
Washington, D. C	9	4:00 a. m.	10:00 p. m.	1.53	7:43 p. m.	7:54 p. m.	1.07	0.22	0.31	0.36											
Wichita, Kans	12	3:45 p. m.	5:09 p. m.	0.65	4:10 p. m.	4:30 p. m.	0.10	0.22	0.32	0.43	0.51										
Williston, N. Dak	11-12			0.53														0.09			
Wilmington, N. C	9			0.18														0.10			
Wytheville, Va	14-15			0.52														0.14			
Yankton, S. Dak	30			1.16														0.30			
San Juan, Porto Rico	3-4	3:52 p. m.	D. N.	5.19	4:06 p. m.	5:44 p. m.	0.01	0.16	0.27	0.42	0.68	0.72	0.77	0.93	1.02	1.02	1.03	1.05	1.39	1.68	
					6:34 p. m.	8:24 p. m.	1.98	0.14	0.37	0.57	0.77	0.86	0.96	1.10	1.24	1.39	1.51	1.74	1.89	2.24	2.45

* Self-register not working

TABLE V.—*Data furnished by the Canadian Meteorological Service, April, 1906.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
St. Johns, N. F	29.81	29.95	+.06	34.0	— 0.5	40.5	27.5	4.81	+0.65	0.0
Sydney, C. B. I	29.93	29.97	+.08	34.5	— 0.5	41.4	27.5	4.72	+0.87	9.0
Halifax, N. S	29.85	29.96	.00	38.9	+ 1.1	46.5	31.4	8.38	+4.20	6.5
Grand Manan, N. B	29.85	29.90	—.04	39.0	— 0.2	45.1	33.0	3.15	+0.19	4.3
Yarmouth, N. S	29.87	29.94	—.02	39.3	+ 0.4	45.9	32.6	3.89	+0.50	0.7
Charlottetown, P. E. I	29.91	29.95	+.05	35.1	— 0.1	41.9	28.4	6.10	+3.45	9.5
Chatham, N. B	29.91	29.93	+.03	37.4	+ 1.9	48.1	26.7	4.32	+1.69	27.4
Father Point, Que	29.92	29.94	+.01	33.5	+ 0.3	40.6	26.3	2.69	+1.11	12.8
Quebec, Que	29.62	29.95	—.04	35.8	+ 0.7	43.8	27.9	2.03	—0.06	9.0
Montreal, Que	29.75	26.96	—.04	42.0	+ 2.3	50.0	33.9	1.92	—0.32	8.2
Rockliffe, Ont.	29.38	30.00	—.02	40.4	+ 2.5	51.8	29.1	0.34	—1.22	0.6
Ottawa, Ont	29.62	29.95	—.07	43.2	+ 3.2	53.6	32.9	0.80	—0.70	0.7
Kingston, Ont.	29.69	30.01	—.01	40.9	+ 0.9	49.4	32.5	1.89	+0.10	13.0
Toronto, Ont	29.63	30.02	.00	44.7	+ 3.9	53.6	35.7	1.77	—0.60	1.6
White River, Ont	28.66	29.99	—.05	37.4	+ 4.4	49.2	25.5	0.67	—0.58	1.6
Port Stanley, Ont	29.39	30.05	+.03	43.2	+ 2.2	53.3	33.1	1.88	—0.59	2.8
Saugeen, Ont	29.32	30.04	+.01	41.7	+ 3.0	50.8	32.6	2.10	+0.30	2.5

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
Parry Sound, Ont	29.31	30.01	—.01	41.2	+ 3.6	51.4	30.9	1.49	—0.42	0.5
Port Arthur, Ont	29.30	30.01	—.02	40.3	+ 6.8	50.0	30.6	0.60	—1.12	0.8
Winnipeg, Man	29.11	29.94	—.08	47.0	+11.1	60.3	33.6	1.64	+0.59	0.0
Minnedosa, Man	28.12	29.94	—.07	46.1	+10.1	60.4	31.8	0.40	—0.66	2.8
Qu'Appelle, Assin	27.65	29.90	—.09	45.1	+ 7.7	57.6	32.6	1.40	+0.35	5.6
Medicine Hat, Assin	27.64	29.92	.00	50.6	+ 6.1	66.2	34.9	0.23	—0.51	0.0
Swift Current, Assin	27.33	29.90	—.06	47.7	+ 6.4	62.6	32.8	0.72	—0.21	3.2
Calgary, Alberta	26.40	29.94	+.04	45.5	+ 5.9	61.1	29.9	0.37	—0.27	0.4
Banff, Alberta	25.36	29.96	+.06	42.4	+ 7.1	55.1	29.7	0.32	—0.76	0.5
Edmonton, Alberta	27.60	29.88	—.01	48.8	+ 8.9	63.1	34.5	0.44	—0.44	0.0
Prince Albert, Sask	28.30	29.86	—.12	43.9	+ 7.8	55.5	31.3	0.76	—0.07	1.0
Battleford, Sask	28.20	29.94	—.03	47.4	+10.2	61.3	33.6	0.31	—0.16	2.8
Kamloops, B. C.										
Victoria, B. C.	30.01	30.11	+.10	50.9	+ 4.1	59.8	42.1	0.46	—1.91	0.0
Barkerville, B. C.	25.70	30.03	+.17	38.9	+ 5.8	49.1	28.7	2.38	+0.56	6.8
Hamilton, Bermuda	29.93	30.10	+.10	63.4	— 0.5	68.2	58.7	3.32	—0.86	
Dawson, Yukon										

Table VI.—*Heights of rivers referred to zeros of gages, April, 1906.*

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
	Miles.	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Milk River.								
Havre, Mont	237	9	4.4	14	3.3	26, 28, 29	3.9	1.1
Yellowstone River.								
Billings, Mont	330	8	2.2	25, 26	0.3	5–7	1.1	1.9
Cheyenne River.								
Rousseau, S. Dak	7	9	4.7	1	— 0.2	28, 29	1.0	4.9
James River.								
Lamoure, N. Dak	330	14	1.9	13	— 1.3	30	0.2	3.2
Huron, S. Dak	139	9	8.9	1	2.5	25, 27	4.4	6.4
Big Blue River.								
Beatrice, Nebr	92	14	4.0	1	2.3	19–26	2.6	1.7
Blue Rapids, Kans	47	14	8.2	30	5.5	20, 28	6.4	2.7
Republican River.								
Clay Center, Kans	42	18	9.3	30	6.9	26–28	7.5	2.4
Solomon River.								
Beloit, Kans	75	16	2.4	9	1.0	22	1.6	1.4
Smoky Hill River.								
Lindsborg, Kans	109	20	2.6	26	1.3	24	1.8	1.3
Abilene, Kans	45	22	1.7	13, 14	1.0	25, 26	1.3	0.7
Kansas River.								
Manhattan, Kans	116	18	5.6	10	3.8	26–28	4.6	1.8
Topeka, Kans	87	21	10.5	10	7.3	27	8.4	3.2
Osage River.								
Bagnell, Mo	70	28	10.4	1	3.0	30	5.4	7.4
Gasconade River.								
Arlington, Mo	98	16	4.8	15	0.6	29	1.9	4.2
Missouri River.								
Townsend, Mont	2,504	11	5.0	26, 27	4.0	4–8	4.3	1.0
Fort Benton, Mont	2,285	12	2.2	27–30	1.2	20	1.7	1.0
Wolfpoint, Mont	1,952	17	2.5	1	1.6	23, 24, 27	2.0	0.9
Bismarck, N. Dak	1,309	14	12.9	2	0.6	26	2.0	12.3
Pierre, S. Dak	1,114	14	6.5	6	1.6	30	2.9	4.9
Sioux City, Iowa	784	19	12.6	8	7.2	27	8.5	5.4
Blair, Nebr	705	15	11.3	9	6.3	26, 27	8.1	5.0
Omaha, Nebr	669	18	13.1	10	9.4	29	10.8	3.7
Plattsmouth, Nebr	641	17	7.8	10	4.0	27, 28	5.7	3.8
St. Joseph, Mo	481	10	9.1	11	4.0	30	6.3	5.1
Kansas City, Mo	388	21	17.0	11	10.5	27, 28, 30	13.4	6.5
Glasgow, Mo	231	18	14.4	12	8.5	30	11.6	5.9
Boonville, Mo	199	20	16.2	12, 13	10.3	30	13.4	5.9
Hermann, Mo	103	24	16.3	14	9.7	30	13.3	6.6
Minnesota River.								
Mankato, Minn	127	18	9.1	17	6.1	30	7.5	3.0
St. Croix River.								
Stillwater, Minn. (a)	23	11	13.8	18	8.2	4	12.1	5.6
Chippewa River.								
Chippewa Falls, Wis	75	16	11.5	15	4.2	30	7.8	7.3
Red Cedar River.								
Cedar Rapids, Iowa	77	14	8.2	1	4.1	30	5.5	4.1
Des Moines River.								
Des Moines, Iowa	205	19	9.4	1	4.5	30	6.7	4.9
Illinois River.								
La Salle, Ill	197	18	19.7	1, 11, 12	15.5	30	18.0	4.2
Peoria, Ill	135	14	15.5	1–3, 15, 16	13.0	30	14.8	2.5
Beardstown, Ill	70	12	15.6	10, 11	12.9	30	14.7	2.7
Clarion River.								
Clarion, Pa	32	10	7.7	11	2.3	29, 30	3.9	5.4
Conemaugh River.								
Johnstown, Pa	64	7	6.2	1	1.0	28–30	3.2	5.2
Allegheny River								
Warren, Pa	177	14	6.2	1	2.0	30	3.8	4.2
Franklin, Pa	114	15	8.2	1	2.4	30	4.8	5.8
Parker, Pa	73	20	8.8	1	2.2	30	5.0	6.6
Freeport, Pa	29	20	16.4	1	4.8	30	9.1	11.6
Springdale, Pa	17	27	20.1	1	8.7	30	12.8	11.4
Cheat River.								
Rowlesburg, W. Va	36	14	10.1	26	3.0	21, 24	4.3	7.1
Youghiogheny River.								
Confluence, Pa	59	10	5.8	1	1.9	30	3.2	3.9
West Newton, Pa	15	23	9.3	1	2.4	30	4.4	6.9
Monongahela River.								
Weston, W. Va	161	18	9.0	26	0.0	8, 9, 13, 14, 21–25, 30	1.1	9.0
Fairmont, W. Va	119	25	23.8	26	15.3	25	17.1	8.5
Greensboro, Pa	81	18	22.0	26	8.3	25	10.6	13.7
Lock No. 4, Pa	40	28	25.8	27	8.6	26	12.5	17.2
Beaver River.								
Ellwood Junction, Pa	10	14	5.4	1	2.9	30	3.7	2.5
Muskingum River.								
Zanesville, Ohio	70	25	22.0	1	9.1	24, 25	11.8	12.9
Beverly, Ohio	20	25	21.2	1	6.1	25	9.3	15.1
Little Kanawha River.								
Glenville, W. Va	77	20	9.0	15	1.4	20, 30	2.8	7.6
Creston, W. Va	38	20	9.8	16	3.3	25, 26	4.7	6.5
New River.								
Radford, Va	155	14	3.5	1	0.9	7, 8	1.4	2.6
Hinton, W. Va	95	14	6.3	1	2.5	26, 27, 30	3.6	3.8
Great Kanawha River.								
Charleston, W. Va	58	30	13.0	16	5.0	26	7.4	8.0
Scioto River.								
Columbus, Ohio	110	17	9.5	1	2.7	25–29	4.1	6.8
Licking River.								
Falmouth, Ky	30	25	18.2	1	2.0	29, 30	4.6	16.2
Miami River.								
Dayton, Ohio	77	18	7.8	1	1.7	30	3.0	6.1
Kentucky River.								
Jackson, Ky	287	24	11.0	11	4.5	30	5.9	6.5
Beattyville, Ky	254	30	12.0	1	0.7	30	2.6	11.3
High Bridge, Ky	117	17	18.1	1	9.8	30	12.0	8.3
Frankfort, Ky	65	31	19.6	1	6.4	28–30	8.4	13.2
Wabash River.								
Terre Haute, Ind	171	16	19.0	1	3.4	30	10.9	15.6
Mount Carmel, Ill	75	15	23.6	8	5.5	30	16.3	18.1

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
	Miles.	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Cumberland River.								
Burnside, Ky	518	50	28.7	1	2.7	30	8.2	26.0
Celina, Tenn	383	45	34.0	2	3.9	30	12.4	30.1
Carthage, Tenn	308	40	32.4	2	3.7	30	11.9	28.7
Nashville, Tenn	193	40	34.4	3	9.5	30	17.8	24.9
Clarksville, Tenn	126	42	38.8	1	8.2	27	21.2	30.6
Powell River.								
Tazewell, Tenn	44	20	4.8	16	1.0	30	2.5	3.8
Clinch River.								
Speers Ferry, Va	156	20	3.6	16	0.1	30	1.4	3.5
Clinton, Tenn	52	25	10.6	1	5.0	30	8.0	5.6
South Fork Holston River.								
Bluff City, Tenn	35	15	4.0	15, 16	1.2	28–30	2.0	2.8
Holston River.								
Mendota, Va	165	12	5.3	16	1.2	28–30	2.2	4.1
Rogersville, Tenn	103	14	5.8	16	2.3	28, 29	2.8	3.5
French Broad River.								
Asheville, N. C	144	6	3.2	15	0.5	12, 13, 25–29	1.0	2.7
Leadvale, Tenn	70	15	5.0	15	0.7	30	2.2	4.3
Dandridge, Tenn	46	15	6.0	16	1.6	28–30	2.4	4.4
Little Tennessee River.								
McGhee, Tenn	17	20	7.7	15	4.1	26, 27, 30	5.0	3.6
Hiwassee River.								
Charleston, Tenn	18	22	6.8	1	2.4	26	3.7	4.4
Tennessee River.								
Knoxville, Tenn	635	29	8.1	17	2.2	30	4.0	5.9
Loudon, Tenn	590	25	6.5	17	2.7	30	3.9	3.8
Kingston, Tenn	556	25	7.6	1	2.9	30	4.8	4.7
Chattanooga, Tenn	452	33	14.8	1	5.2	27	8.0	9.6
Bridgeport, Ala	402	24	12.0	1	3.3	28	6.2	8.7
Guntersville, Ala	349	31	18.8	2	6.4	29	10.6	12.4
Florence, Ala	255	16	11.8	2, 3	3.6	29	6.6	8.2
Riverton, Ala	225	26	19.3	3	6.0	30	10.8	13.3
Johnsonville, Tenn	95	21	22.0	2	6.6	28	12.6	15.4
Ohio River.								
Pittsburg, Pa	966	22	18.8	1	4.5	26	9.2	14.3
Davis Island Dam, Pa	960	25	18.1	1	6.8	26	10.3	11.3
Beaver Dam, Pa	925	27	26.5	1	8.7	25, 26	14.3	17.8
Wheeling, W. Va	875	36	27.5	1	8.2	25–27	14.7	19.3
Parkersburg, W. Va	785	36	30.0	2	9.0	25, 26	16.1	21.0
Point Pleasant, W. Va	703	39	37.3	2	9.5	26	20.2	27.8
Huntington, W. Va	660	50	42.6	2	13.8	27	25.0	28.8
Catlettsburg, Ky	651	50	43.9	2	13.0	27	25.4	30.9
Portsmouth, Ohio	612	50	47.4	2	13.7	27	26.8	33.7
Maysville, Ky	559	50	46.3	2	14.1	28	27.0	32.2
Cincinnati, Ohio	499	50	50.2	2	16.1	29	30.3	34.1
Madison, Ind	413	46	43.0	3	14.1	29	26.6	28.9
Louisville, Ky	367	28	26.3	3	6.4	30	12.5	19.9
Evansville, Ind	184	35	41.1	6	13.6	30	28.4	27.5
Mount Vernon, Ind	148	35	41.3	7	13.8	30	29.5	27.5
Paducah, Ky	47	40	40.5	8	17.7	30	32.5	22.8
Cairo, Ill	1	45	46.9	9	29.7	30	41.5	17.2
St. Francis River.								
Marked Tree, Ark	104	17	16.5	16, 17	15.1	1	15.9	1.4
Neosho River.								
Neosho Rapids, Kans	326	22	15.8	10	1.6	2–4	4.7	14.2
Iola, Kans	262	10	4.6	11, 15	0.4	20	1.9	4.2
Oswego, Kans	184	20	8.5	13	1.0	25, 26	3.2	7.5
Fort Gibson, Ind. T	3	22	18.2	16	12.6	12, 13	14.0	5.6
Canadian River.								
Calvin, Ind. T	99	10	5.5	5	2.3	28, 29	3.4	3.2
Black River.								
Blackrock, Ark	67	12	24.1	2	12.0	30	19.3	12.1
White River.								
Calicorock, Ark	272	15	13.3	14	3.5	30	7.1	9.8
Batesville, Ark	217	18	17.6	1	5.7	30	9.8	11.9
Newport, Ark	185	26	29.0	1	13.8	30	22.1	15.2
Clarendon, Ark	75	30	33.1	6	26.2	1	29.5	6.9
Arkansas River.								
Wichita, Kans	832	10	1.2	9	— 0.4	26–29	0.2	1.6
Tulsa, Ind. T	551	16	5.3	18	3.1	4	3.9	2.2
Webbers Falls, Ind. T	465	23	9.2	9, 10	6.2	26–29	7.8	3.0
Fort Smith, Ark	403	22	12.7	14	5.4	30	8.7	7.3
Dardanelle, Ark	256	21	13.0	15	5.3	29	9.3	7.7
Little Rock, Ark	176	23	17.8	1	7.2	30	11.6	10.6
Yazoo River.								
Greenwood, Miss	175	38	21.3	9	11.5	30	18.7	9.8
Yazoo City, Miss	80	25	22.6	27, 29	16.3	1	20.0	6.3
Ouachita River.								
Camden, Ark	304	39	31.9	4	7.0	30	18.0	24.9
Monroe, La	122	40	30.3	20–22	25.0	1	28.6	5.3
Red River								
Denison, Tex. (b)	768	22	9.3	7	— 0.2	4	3.4	9.5
Arthur City, Tex	688	27	18.0	8	7.2	5	10.4	10.8
Fulton, Ark	515	28	22.5	11	12.4	29	17.9	10.1
Shreveport, La	327	29	15.5	12, 13	10.0	30	13.4	5.5
Alexandria, La	118	33	24.0	17	19.3	29, 30	22.0	4.7
Mississippi River								
Fort Ripley, Minn. (c)	2,082	10	9.9	7	7.6	3	8.8	2.3
St. Paul, Minn	1,954	14	12.0	19	7.2	2	10.4	4.8
Red Wing, Minn	1,914	14	11.0	18–20	4.5	1	9.1	6.5
Reeds Landing, Minn	1,884	12	10.1	19	4.0	1	8.3	6.1
La Crosse, Wis	1,819	12	11.5	20, 21	8.7	1, 2, 4	10.2	2.8
Prairie du Chien, Wis. (d)	1,759	18	15.4	22, 23	11.2	5, 6	13.7	4.2
Dubuque, Iowa	1,699	18	16.6	21–25	10.5	1	14.2	6.1
Clinton, Iowa	1,629	16	15.3	22–27	8.5	1	13.0	6.8
Leclaire, Iowa	1,609	10	10.4	22–25	6.4	2, 3	8.8	4.0
Davenport, Iowa	1,593	15	14.0	26	8.8	1	12.1	5.2
Muscatine, Iowa	1,562	16	14.6	23, 24	10.7	2	13.2	3.9
Galland, Iowa	1,472	8	7.9	26–28	6.2	1, 2	7.1	1.7
Keokuk, Iowa	1,463	15	14.1	25	11.5	2	12.8	2.6
Warsaw, Ill	1,458	18	16.8	24–27	14.7	1, 2	15.8	2.1
Hannibal, Mo	1,402	13	15.2	25–29	13.2	1–4	14.2	2.0

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Grafton, Ill	1,306	23	18.3	15	16.9	4-6	17.6	1.4
St. Louis, Mo	1,264	30	26.2	15	21.1	30	23.8	5.1
Chester, Ill	1,189	30	22.7	1, 16	18.0	30	20.8	4.7
Cape Girardeau, Mo	1,128	28	27.6	2	22.1	30	25.6	5.5
New Madrid, Mo	1,003	34	37.0	9-12	24.7	30	33.4	12.3
Luxora, Ark	905	33	31.3	14, 15	20.4	30	27.9	10.9
Memphis, Tenn	843	33	37.1	16	26.0	30	33.5	11.1
Helena, Ark	767	42	47.0	18, 19	36.0	1	43.4	11.0
Arkansas City, Ark	635	42	50.0	22	39.4	1	46.8	10.6
Greenville, Miss	595	42	44.9	23, 24	33.1	1	41.0	11.8
Vicksburg, Miss	474	45	47.2	26	35.5	1	43.2	11.7
Natchez, Miss	373	46	46.7	29, 30	35.9	1	42.5	10.8
Baton Rouge, La	240	35	34.9	30	26.6	1, 2	31.0	8.3
Donaldsonville, La	188	28	27.3	30	20.9	1	24.3	6.4
New Orleans, La	108	16	17.1	30	13.4	1	15.4	3.7
Atchafalaya River.								
Simmesport, La	127	33	39.5	30	30.9	1	35.4	8.6
Melville, La	103	31	35.9	30	31.1	1	33.6	4.8
Morgan City, La	19	8	5.0	26	2.8	17	3.8	2.2
Grand River.								
Eaton Rapids, Mich	166	6	4.1	14-17	3.6	27-30	3.9	0.5
Lansing, Mich	140	11	6.9	16	2.7	29	4.5	4.2
Grand Ledge, Mich. (a)	129	6	5.0	15	2.1	30	3.4	2.9
Portland, Mich	103	12	5.4	15-17	2.9	29, 30	4.0	2.5
Ionia, Mich	81	24	16.0	16, 17	9.4	30	12.4	6.6
Lowell, Mich	65	19	9.7	17, 18	4.8	29, 30	6.9	4.9
Grand Rapids, Mich	38	11	6.7	18	2.2	30	4.2	4.5
Sandusky River.								
Tiffin, Ohio	65	8	4.0	1	0.5	26-30	1.3	3.5
Maumee River.								
Napoleon, Ohio	44	13	5.5	1	0.1	28	1.6	5.4
Penobscot River.								
Mattawamkeag, Me. (15)	87	..	18.5	17	15.5	22	16.0	3.0
West Enfield, Me. (2)	60	..	12.0	20	5.8	3	9.0	6.2
Kennebec River.								
Winslow, Me	46	8	5.9	16, 17	3.7	28	4.9	2.2
Merrimac River.								
Franklin Junction, N. H	110	13	16.1	16	5.3	1	7.5	10.8
Concord, N. H.	94	10	7.0	16	2.0	9, 10, 29, 30	3.4	5.0
Manchester, N. H	68	8	6.1	17	1.8	3	3.2	4.3
Connecticut River.								
Wells River, Vt. (7)	255	......	29.5	18	24.0	14	26.8	5.5
Whiteriver Junction, Vt	209	......	17.3	16	7.2	4	11.1	10.1
Bellows Falls, Vt.	170	12	9.2	16	2.4	11	4.9	6.8
Holyoke, Mass	84	9	8.8	17	2.6	4	4.9	6.2
Hartford, Conn	50	13	19.8	17	7.9	5	12.6	11.9
Housatonic River.								
Gaylordsville, Conn	44	15	8.1	16	5.3	29	6.4	2.8
Mohawk River.								
Utica, N. Y.	98	6	9.4	16	2.3	30	6.1	7.1
Tribeshill, N. Y	42	12	8.0	16	1.5	30	3.7	6.5
Schenectady, N. Y	19	15	10.8	16	1.5	30	4.6	9.3
Hudson River.								
Glens Falls, N. Y	197	20	7.8	18-21	4.9	12	6.3	2.9
Troy, N. Y	154	14	11.9	16, 17	6.1	29	7.9	5.8
Albany, N. Y	147	12	11.6	16	4.0	5	7.1	7.6
Pompton River.								
Pompton Plains, N. J	6	8	6.1	10	4.5	29, 30	4.9	1.6
Passaic River.								
Chatham, N. J	69	7	5.3	16	2.8	9, 23, 29, 30	3.7	2.5
Lehigh River.								
Mauch Chunk, Pa	45	15	11.3	15	4.5	27-30	5.6	6.8
Schuylkill River.								
Reading, Pa	66	12	6.7	16	0.8	26, 27	1.9	5.9
Delaware River.								
Hancock (E. Branch), N. Y	269	12	9.1	16	3.7	30	5.3	5.4
Hancock (W. Branch), N. Y.	269	10	7.9	16	3.7	29, 30	5.3	4.2
Port Jervis, N. Y	204	14	9.6	16	1.9	30	4.5	7.7
Phillipsburg, N. J.	142	26	16.2	16	3.8	30	7.3	12.4
Trenton, N. J	92	18	9.0	16	3.0	30	5.0	6.0
North Branch Susquehanna.								
Binghamton, N. Y	183	16	9.9	16	3.0	30	6.0	6.9
Towanda, Pa	139	16	9.4	16	2.4	30	5.7	7.0
Wilkes-Barre, Pa	60	17	17.9	1	6.1	30	11.5	11.8
West Branch Susquehanna.								
Clearfield, Pa	165	8	4.5	1	1.3	29, 30	2.4	3.2
Renovo, Pa.	90	16	8.4	1	2.0	30	4.8	6.4
Williamsport, Pa	39	20	10.9	11	3.2	30	6.7	7.7
Juniata River.								
Huntingdon, Pa.	90	24	7.6	10	3.7	30	5.1	3.9
Susquehanna River.								
Selinsgrove, Pa	116	17	9.3	1	3.0	30	6.1	6.3
Harrisburg, Pa	69	17	11.4	16	3.7	30	7.4	7.7
Shenandoah River.								
Riverton, Va	58	22	1.0	1	− 0.3	16-30	0.0	1.3
Potomac River.								
Cumberland, Md	290	8	6.4	1	2.6	28-30	3.9	3.8
Harpers Ferry, W. Va	172	18	11.0	1	3.0	26, 27	6.3	8.0
James River.								
Buchanan, Va	305	12	6.4	1	3.0	30	4.2	3.4
Lynchburg, Va	260	18	5.0	1	1.0	30	2.5	4.0
Columbia, Va	167	18	12.1	16	4.7	30	7.1	7.4
Richmond, Va	111	12	4.8	16	0.7	8, 22	1.5	4.1
Dan River.								
Danville, Va	55	8	1.3	1	0.0	27-30	0.4	1.3
Roanoke River.								
Clarksville, Va	196	12	5.9	1	0.6	30	1.8	5.3
Weldon, N. C	129	30	26.7	2	10.2	29	13.7	16.5
Tar River.								
Tarboro, N. C	46	25	15.8	4	3.5	30	7.2	12.3
Greenville, N. C.	21	22	13.2	6	4.6	30	8.0	8.6
Haw River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Moncure, N. C	171	25	14.9	1	8.5	14, 21-30	9.1	6.4
Cape Fear River.								
Fayetteville, N. C	112	38	35.5	1	4.4	30	10.1	31.1
Waccamaw River.								
Conway, S. C	40	7	5.0	1	2.0	29	3.7	3.0
Pedee River.								
Cheraw, S. C	149	27	22.0	1	2.9	27, 28	5.7	19.1
Smiths Mills, S. C	51	16	14.4	7	5.5	30	10.8	8.9
Lynch Creek.								
Effingham, S. C	35	12	9.5	2, 3	4.5	30	6.9	5.0
Black River.								
Kingstree, S. C. (a)	45	12	9.4	7, 8	3.3	29, 30	6.4	6.1
Catawba River.								
Mount Holly, N. C	28	15	3.8	1	2.0	21-27, 30	2.3	1.8
Wateree River.								
Camden, S. C	37	24	18.8	2	6.7	30	9.8	12.1
Broad River.								
Blairs, S. C	36	14	4.5	1, 16	1.4	30	2.4	3.1
Saluda River.								
Chappels, S. C	56	14	7.6	1	3.9	23, 24, 27	5.0	3.7
Congaree River.								
Columbia, S. C	52	15	6.0	1	1.5	9, 23	2.4	4.5
Santee River.								
St. Stephens, S. C	50	12	9.1	1	6.2	30	8.2	2.9
Edisto River.								
Edisto, S. C	75	6	4.7	3	2.2	30	3.6	2.5
Broad River.								
Carlton, Ga	30	11	4.2	1	2.7	23-26	3.1	1.5
Savannah River.								
Calhoun Falls, S. C	347	15	4.5	15	2.9	26, 27	3.5	1.6
Augusta, Ga	268	32	15.8	1	8.8	25-27	10.5	7.0
Oconee River.								
Milledgeville, Ga	147	25	7.7	1	3.6	25, 26, 28	4.7	4.1
Dublin, Ga	79	30	10.0	2	0.9	29	3.7	9.1
Ocmulgee River.								
Macon, Ga	203	18	9.2	1	3.2	28	4.8	6.0
Abbeville, Ga	96	11	11.0	3	3.7	29, 30	6.8	7.3
Flint River.								
Woodbury, Ga	227	10	2.5	1	0.5	29	1.1	2.0
Montezuma, Ga	152	20	11.8	1	3.4	30	5.9	8.4
Albany, Ga.	90	20	10.4	3	1.9	30	4.9	8.5
Bainbridge, Ga.	29	22	11.0	4, 5	3.9	30	7.0	7.1
Chattahoochee River.								
Oakdale, Ga	305	18	5.6	1	3.2	17, 18	4.0	2.4
West Point, Ga	239	20	6.4	1, 2	3.1	28	4.2	3.3
Eufaula, Ala	90	40	8.5	1, 4	3.5	30	5.5	5.0
Alaga, Ala	30	25	14.1	1	5.2	30	8.2	8.9
Coosa River.								
Rome, Ga	266	30	10.2	1	2.9	27	4.6	7.3
Gadsden, Ala	162	22	14.3	1	3.0	28	5.9	11.3
Lock No. 4, Ala	113	17	12.1	1	2.7	29, 30	5.3	9.4
Wetumpka, Ala	12	45	32.9	1	6.4	29	12.5	26.5
Tallapoosa River.								
Milstead, Ala	42	35	11.2	1	3.2	29, 30	5.4	8.0
Alabama River.								
Montgomery, Ala	323	35	34.5	1	3.7	30	10.3	30.8
Selma, Ala	246	35	43.4	1	5.8	30	15.4	37.6
Black Warrior River.								
Tuscaloosa, Ala	90	43	49.0	1	6.8	30	16.8	42.2
Tombigbee River.								
Columbus, Miss	316	33	18.3	1, 2	− 2.0	28, 29	3.5	20.3
Vienna, Ala	246	42	30.2	4	1.8	30	10.7	28.4
Demopolis, Ala.	168	35	52.6	5, 6	3.9	30	27.3	48.7
Leaf River.								
Hattiesburg, Miss	60	20	15.0	1	3.8	29, 30	6.2	11.2
Chickasawhay River.								
Enterprise, Miss	144	18	17.8	1	2.2	27, 28	5.1	15.6
Shubuta, Miss	106	25	28.0	2	3.6	29, 30	9.2	24.4
Pascagoula River.								
Merrill, Miss.	78	20	20.6	1	4.5	30	11.9	16.1
Pearl River.								
Jackson, Miss	242	20	28.8	1	3.3	29, 30	14.0	25.5
Columbia, Miss	110	14	21.7	2, 3	6.9	30	13.8	14.8
Sabine River.								
Logansport, La	315	25	27.7	2	10.6	30	20.0	17.1
Neches River.								
Rockland, Tex	105	20	8.1	1	4.0	11	5.6	4.1
Beaumont, Tex	18	10	2.4	15, 20	1.5	11	1.9	0.9
Trinity River.								
Dallas, Tex	320	25	24.1	22	6.0	3, 5	9.7	18.1
Long Lake, Tex	211	35	21.7	11	11.3	22	17.8	10.4
Riverside, Tex	112	40	13.7	30	6.3	24	9.8	7.4
Liberty, Tex	20	25	15.7	17	8.2	1	11.9	7.5
Brazos River.								
Kopperl, Tex.	345	21	1.2	22	0.0	1-17	0.2	1.2
Waco, Tex	285	24	4.9	22	2.8	2-5, 14-17	3.3	2.1
Valley Junction, Tex	215	40	9.2	15	2.7	3, 4, 12	4.2	6.5
Hempstead, Tex	140	40	10.0	16	0.5	1	2.8	9.5
Booth, Tex	61	39	5.7	12, 27	4.3	1-9	4.8	1.4
Colorado River.								
Ballinger, Tex	489	21	4.2	20	1.8	1-4, 7, 26-30	2.2	2.4
Austin, Tex	214	18	3.7	21, 22	1.6	16	2.2	2.1
Columbus, Tex	98	24	8.0	1	6.4	9-13	6.9	1.6
Guadalupe River.								
Gonzales, Tex	112	22	0.9	1, 21	0.7	9-12, 14, 17-19, 24-30	0.8	0.2
Victoria, Tex	35	16	2.5	21-23	1.5	30	2.0	1.0
Rio Grande River.								
San Marcial, N. Mex.	1233	14	10.0	10	7.4	2	8.6	2.6
El Paso, Tex. (a)	1030	11	9.8	30	....	....	8.0	......
Red River of the North.								
Moorhead, Minn	284	26	15.5	9	10.8	28-30	13.0	4.7

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
	Miles.	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Kootenai River.								
Bonners Ferry, Idaho	123	24	13.1	25	0.2	1	6.3	12.9
Pend d'Oreille River.								
Newport, Wash.	86	14	4.5	30	— 0.4	1,2	1.8	4.9
Snake River.								
Lewiston, Idaho	144	24	10.2	24,25	7.0	7,8	8.5	3.2
Riparia, Wash.	67	30	10.2	25	7.4	7	8.5	2.8
Columbia River.								
Wenatchee, Wash	473	40	17.1	30	6.0	1	10.8	11.1
Umatilla, Oreg.	270	25	11.1	26,27	5.8	5	8.2	5.3
Columbia River—Cont'd.								
The Dalles, Oreg.	166	40	16.8	27,28	9.8	1	12.5	7.0
Willamette River.								
Albany, Oreg.	118	20	7.0	2	3.5	19-21	4.5	3.5
Salem, Oreg	84	20	6.0	2	2.2	20,21	3.1	3.8
Portland, Oreg.	12	15	9.5	28	5.6	1	7.2	3.9
Sacramento River.								
Red Bluff, Cal.	201	23	25.0	1	6.0	26,27,30	8.5	19.0
Sacramento, Cal.	64	25	27.4	2	21.4	29,30	23.6	6.0

Figures after names of stations indicate number of days frozen. (a) 4 days missing. (b) 2 days missing. (c) 9 days missing.

Honolulu, T. H., latitude 21° 19' north, longitude 157° 52' west; barometer above sea, 38 feet; gravity correction, —.057, applied. April, 1906.

Day.	Pressure.* 8 a. m.	Pressure.* 8 p. m.	Air temperature. 8 a. m.	Air temperature. 8 p. m.	Maximum.	Minimum.	Moisture. 8 a. m. Wet.	8 a. m. Relative humidity.	8 p. m. Wet.	8 p. m. Relative humidity.	Wind. 8 a. m. Direction.	8 a. m. Velocity.	8 p. m. Direction.	8 p. m. Velocity.	Precipitation. 8 a. m.	Precipitation. 8 p. m.	Clouds. 8 a. m. Amount.	8 a. m. Kind.	8 a. m. Direction.	8 p. m. Amount.	8 p. m. Kind.	8 p. m. Direction.
1	29.98	30.00	73.4	72.0	77	67	68.3	77	67.2	78	ne.	2	ne.	4	0.00	0.00	2 6	Cu. S.-cu.	se. se.	few.	Cu.	0
2	30.01	30.00	75.4	72.3	82	65	67.2	65	68.0	80	e.	4	se.	2	0.00	0.00	few.	Cu.	0	few.	S.-cu.	0
3	30.05	30.06	72.5	73.6	78	67	66.2	72	67.2	72	e.	3	ne.	5	0.00	0.00	few.	S.-cu.	0	1	S.-cu.	0
4	30.10	30.04	74.0	71.2	77	70	67.6	72	66.2	77	ne.	15	n.	18	0.00	T.	2	Cu.	e.	1	S.-cu.	n.
5	30.08	30.05	72.1	72.8	78	70	67.0	77	65.5	68	ne.	10	ne.	8	T.	T.	9	S.-cu.	e.	2	S.-cu.	ne.
6	30.06	30.06	73.6	72.5	79	70	64.6	61	64.4	65	e.	13	e.	9	0.00	T.	1 4	Ci.-s. S.-cu.	? e.	1	S.-cu.	e.
7	30.13	30.14	75.2	72.0	79	68	64.1	54	66.1	73	ne.	11	e.	11	0.00	T.	1	Cu.	e.	5	S.-cu.	e.
8	30.14	30.14	74.5	72.3	79	69	64.5	58	63.8	63	ne.	11	e.	9	0.03	0.00	1	S.-cu.	e.	2 2	Ci.-s. S.-cu.	w. e.
9	30.14	30.10	75.4	72.2	79	70	64.1	54	64.9	68	ne.	9	ne.	13	0.00	0.00	1	S.-cu.	e.	1	S.-cu.	e.
10	30.08	30.03	75.0	71.9	79	69	63.4	60	64.4	67	e.	7	e.	4	0.00	0.00	1	Cu.	e.	1	S.-cu.	0
11	30.06	30.03	75.2	72.0	79	66	65.2	58	65.3	70	ne.	3	e.	7	0.00	0.00	1	S.-cu.	e.	1	S.-cu.	e.
12	30.07	30.06	76.7	73.0	80	69	66.3	57	64.0	61	e.	3	ne.	9	0.00	0.00	1	S.-cu.	e.	1	S.-cu.	e.
13	30.10	30.11	74.0	73.6	80	69	68.9	78	67.0	71	e.	6	ne.	9	0.01	0.01	2 4	Ci.-s. S.-cu.	w. e.	9	S.-cu.	e.
14	30.11	30.09	74.7	73.8	79	70	66.1	63	65.8	65	e.	4	ne.	11	T.	T.	8	S.-cu.	ne.	3	S.-cu.	e.
15	30.11	30.07	72.5	71.8	78	68	67.0	75	66.3	75	ne.	10	ne.	4	0.03	T.	2 5	S.-cu. N.	e. e.	5	S.-cu.	e.
16	30.08	30.05	75.3	73.1	80	70	66.0	61	67.0	73	ne.	5	ne.	9	T.	T.	1	S.-cu.	e.	8	N.	e.
17	30.10	30.10	75.9	73.4	81	72	65.8	58	65.9	67	e.	12	e.	2	T.	0.00	3 1	Ci.-s. Cu.	w. e.	2	S.-cu.	e.
18	30.13	30.10	76.2	74.2	80	70	66.4	60	66.5	66	n.	8	ne.	4	0.00	T.	1 3	Ci. Ci.-s.	w. e.	9	S.-cu.	e.
19	30.07	30.05	74.5	72.2	78	70	66.5	66	65.3	69	ne.	11	ne.	15	T.	0.00	2	S.-cu.	e.	1	S.-cu.	0
20	30.08	30.07	70.0	70.3	74	67	66.2	82	63.3	68	e.	9	ne.	11	0.07	0.01	5 4	S.-cu. N.	ne. ne.	2	S.-cu.	ne.
21	30.09	30.11	73.3	72.2	78	69	63.7	59	65.5	70	ne.	17	e.	12	T.	T.	few.	S.-cu.	e.	5 3	S.-cu. N.	e. e.
22	30.14	30.12	75.0	73.[illegible]	78	70	67.5	68	65.8	67	ne.	11	ne.	7	0.01	T.	6	S.-cu.	e.	4	S.-cu.	e.
23	30.15	30.12	75.3	73.[illegible]	80	72	66.6	63	66.0	68	e.	10	ne.	13	0.00	T.	1 3	Cu. S.-cu.	e. e.	4 4	A.-cu. S.-cu.	w. e.
24	30.11	30.08	75.7	73.4	80	70	68.4	69	67.0	71	se.	9	n.	3	T.	0.00	7	S.-cu.	e.	3 4	A.-cu. S.-cu.	w. 0
25	30.10	30.09	75.4	74.0	81	70	66.5	62	67.2	70	n.	5	ne.	10	0.00	0.00	1	S.-cu.	e.	5	S.-cu.	e.
26	30.10	30.10	75.9	73.3	81	72	67.0	62	67.0	72	ne.	8	se.	4	T.	T.	2 2	Ci.-s. S.-cu.	w. e.	2 3	Ci.-s. S.-cu.	w. e.
27	30.09	30.08	76.0	73.9	81	71	66.6	61	66.4	67	e.	11	ne.	5	0.01	0.00	7 3	Ci.-s. S.-cu.	w. e.	1 1	Ci.-cu. S.-cu.	w. 0
28	30.07	30.04	72.0	73.3	79	70	67.5	79	68.0	76	ne.	7	ne.	3	T.	T.	9	S.-cu.	se.	1	Cu.	sw.
29	30.06	30.01	76.0	72.0	80	68	68.0	66	66.2	74	ne.	6	ne.	17	0.00	0.00	1 1	Cu. S.-cu.	e. e.	1	S.-cu.	e.
30	30.02	30.00	71.0	67.9	75	65	61.8	50	59.1	59	n.	16	n.	8	0.00	0.00	3 1	Ci.-cu. S.-cu.	w. ne.	few.	S.-cu.	0
31																						
Mean	30.087	30.070	74.4	72.6	79.0	69.1	66.2	65.2	65.7	69.7	ne.	8.5	ne.	8.2	0.16	0.02	3.9	S.-cu	e.	3.3	S.-cu.	e.

Observations are made at 8 a. m. and 8 p. m., local standard time, which is that of 157° 30' west, and is 5h and 30m slower than 75th meridian time. * Pressure values are reduced to sea level and standard gravity.

RAINFALL IN JAMAICA.

Through the kindness of Dr. H. H. Cousins, chemist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following table.

Comparative table of rainfall, February, 1906.

Divisions.	Relative area.	Number of stations.	Rainfall. 1906.	Rainfall. Average.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	25	24	6.11	5.40
Northern division	22	37	3.29	2.67
West-central division	26	21	5.95	2.68
Southern division	27	35	5.25	1.93
Means	100		5.15	3.17

APRIL, 1906.

Northeastern division	25	24	8.39	5.95
Northern division	22	48	4.81	3.30
West-central division	26	22	11.87	7.33
Southern division	27	34	7.01	4.27
Means	100		8.02	5.21

Based upon the average stations only.

The rainfall for February was very much above the average for the whole island. The greatest fall, 19.84 inches, occurred at Long Hill, in the southern division, while the least, 0.23 inch, was recorded at Ballast Ground, in the same division.

The rainfall for April was also very much above the average for the whole island. The greatest fall, 24.25 inches, was recorded at Pepper, in the southern division, while the least, 1.17 inches, occurred at Etingdon, in the northern division.